Affective Website Design

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The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

Although, today, website design still contains many variable design elements which strongly influence its design outcome, like browser usage, platforms, user preferences, window size, connection speed, computer speed, colour support, software support, and font support, the original design idea still plays an important role. Emotion is difficult to measure or evaluate. Designers need to understand its importance and how to measure emotion efficiently in order to undertake the subsequent design stage.

> Positive emotions are as important as negative ones-positive emotions are critical to learning, curiosity, and creative thought, and today research is turning toward this dimension (Norman, 2004b: 19).

To understand users' negative emotions can supply a better solution for design problems. Both users' likes and dislikes are important when exploring the role of emotional design.

The fieldwork consisted of two pilot tests (the initial pilot test-I.P.T. and the second pilot test-S.P.T.), a website impression test (W.I.T.), and an improved website impression test (I.W.I.T.).

The research methods involved Think-Aloud usability testing, Emotional Probes testing (EPs testing), and questionnaires. In addition, the evaluation method used a coding system and statistics. Triangulation was used in making consistent the process methods and evaluation methods.

The research outcomes include a fashion website design reference model, an insurance website design reference model, and the website impression test system. Through conducting the fieldwork, the importance of emotional design can be identified in the website design field. The whole research process and research outcomes supply one solution for researchers and designers to predict users' emotions in design outcomes.

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Chapter 1 Introduction

1.1 The research process and rationale

This chapter consists of the research process and rationale, the organization and outline of the thesis, and the research timetable. It also supplies a basic understanding of this affective study in order to explore the role of emotional design in the website design field. In an interview for Product Magazine, an industrial design magazine from the Netherlands, Norman stated that:

> It is time to move the focus from making things practical (they function well, they are understandable) to products and services that are enjoyable, that give pleasure, and even fun. That is the focus of emotional design: to make our lives more pleasurable (Norman, Dec 2004a).

If true, this will have a major influence on website design in the future. It is well known that the Internet is playing an ever increasing role in daily life, and becoming a vital factor in business development. But high web hit rates are not equal to high conversion rates, and to enhance usability may be one effective solution to increasing web conversion rates. It also give users a positive emotion when using the website. This is also a sort of user-centered design concept which has been adopted widely in the website design process. The bad influence of low web usability can easily decrease the web hit rate and the conversion rate. This will reduce the commercial promotion and the user's emotion. In other words, users do not visit this sort of website again. Does current usability testing involve all of the design factors in website design? User's emotional response may be influenced by other design factors which belong to usability or user's direct favour. Is emotional design worth exploring in website design? To enhance the usability of the website has a great relevance to discussing the role of emotional design in website design. What kinds of emotions should be created in a web design outcome, noticed in the design process, and correctly transferred into users' impressions? To create a convenient, confident, and comfortable web environment for users may be the aim for web designers. These sorts of web user emotions can be called 'the 3C concept'. Convenience, confidence, and comfort all belong to human positive emotion and are worth discussing here. For the many invisible users, their likes and dislikes, are worth analysing and these results can be used to improve the web design process in order to predict users' impression during the design process or at the launch stage.

Websites are often employed as extensions of products, and professional web designers need to consider the functions of websites which can really meet the different requests of function considerations, how to design new visual effects on web pages which can create uniqueness, how to classify web pages which can follow the user's logical thinking, and how to bring excitement and fresh interest to users which can meet the demand of web users' impression-short term memory considerations. This improvement may encourage users to return and make regular use of well-designed websites. Moreover, they can help to create effective business styles, enhance promotions for companies, or supply good visual performance for users. The question is 'Can this concept be the next step for website design?' and 'Does Norman's definition of emotional design cover all spheres of design?' When considering design capability and awareness, usability and understandability are always key points. Does this development mean that emotional design is destined to become another fundamental design element in website design or is this already the case? Moreover, how to control emotion has always been an important key point for artists, especially painters. In art history, Impressionism emphasized controlling light, creating atmosphere, and ignoring visual details in works. This does not mean that web detail is not important for website design but it is important to discuss how to attract users' attention. Art has always been regarded as a highly personal kind of activity. To control emotion well through their work has always been a basic element of artistic creativity, art belongs to older types of human activities, and so the development of emotional design may cause certain difficulties in the development of design. For example, emotion is difficult to measure or evaluate. Designers need to understand its importance and how to measure emotion efficiently in order to undertake the subsequent design stage. Does this prediction bring any threat to traditional or contemporary design? This research aims to identify the importance of emotional design and to explore a possible and efficient method to measure users' impressions for website outcomes. It is hard to predict the future development of website design but emotional design may be the future. In current websites, more animations and interactive effects are widely used; this design point is creating a dramatic influence. Much evidence is currently shown in graphic design, product design, technical design, and other design research fields. This new concept supplies us with a new way to consider communication and its value in terms of design. Finally, the aim of this research is to find an appropriate research methodology, a website design reference model, and a website impression test system for website design in order to increase professional value and improve design outcomes.

Dynamic web development using suitable tools can easily create stunning effects and

positive emotions for web users at present but web designers face new challenges in adding this essential design element. Following the development of technology, the necessity of animation and sound will become important. Through adopting more spent navigation on websites, designing these sorts of dynamic websites is more complicated than designing simple websites or being limited to the functionality of websites. This area remains open for further discussion in terms of website design. Through the development of technology, dynamic websites will become more common in the future. The influence of animation and sound is becoming another research topic in website design. This point has also a great relevance for emotional design. The first new challenge is that spent navigation considerations in website design are more complicated than traditional graphic design considerations. This development will be a great challenge for web designers. Website design still contains many variable design elements which strongly influence the design outcome, like browser usage, platforms, user preferences, window size, connection speed, computer speed, colour support, software support, and font support, but the original design idea still plays an important role in website design, as in other design fields. The second challenge for web designers is to design for these above variable design elements. These variable design elements should aim to meet the demands of clients and web users. In addition, the third challenge is that the developments in software and hardware and web environment considerations will also play several key roles in the development of website design in the future.

The author's central question is how to produce a website design reference model to combine the website basic design factors, dynamic web development, usability considerations, and reduce the influence of variable design elements in order to give better web design outcomes providing better usability, and creating positive emotion, pleasure, and fun for web users. What kinds of emotion should be created in web outcomes? In other words, to create affective websites for users means adding positive emotional design to the necessary web design elements and avoiding negative emotions on websites. There are also challenges for web designers in their design processes. Moreover, meeting the demand of business strategies involves increasing the level of website design. The five key research questions are shown below.

Key Research Questions

1. What is emotional design in terms of website design?
2. What is the impact of emotional design on website design?
3. What are the key problems facing users in website design?
4. Which methods are currently used in website design?

5. How can we evaluate emotional design in website design and use the result to enhance the quality of websites?

To consider the user-centered concept in website design, the method for controlling user's emotions and evaluating this design element can help designers to build a website to a high level of functionality and visual effects that can supply 'the 3 C concept'. 'The 3C concept' - convenience, confidence, and comfort - is a very important component in the website design process. If adopting long-term considerations, it may be better for website design to approach a similar level with products and business strategies. At present, many commercial websites are designed to approach the product life cycle. More professional websites are designed as dynamic websites in order to create fun for their web users, and it should be noticed because this development lies outside the traditional functionality considerations. The problem is that designers cannot really understand the depth of the user's emotion and they are influenced by many variable web design elements. This is the main reason why emotional design should be noticed in this development. Emotional design can be observed in many aspects of website design.

Due to these animations, sounds, and changing images, the aim of their installment is to create unknown emotion in users. Through this development, what should be noticed by web designers is that, although website design concerns a variety of different research fields, it does not mean that it is unnecessary to search for an appropriate method at present. As a website consists of a variety of design elements, each element can create the user's positive emotion but it may also destroy it.

The first challenge is to design for many different variable web design elements which will not cause users to experience negative emotions. The second challenge is how to develop dynamic websites in order to create fun and pleasure for web users. The final challenge is that the developments in software and hardware and web environment considerations also play several key roles in the development of website design in the future. In the design process, what kinds of elements should be controlled well in order to create positive emotion for web users? In addition, website design software was not developed for designers, and HTML, JAVA, and CSS languages are the only way to build websites for users. The technology to develop website design still faces many difficulties, especially in visual research and interface design research. It is definitely true that good interface design and better visual web pages can enhance usability in order to give users a positive emotion. After conducting the initial pilot test (I.P.T.), the second pilot test (S.P.T.), the website impression test (W.I.T.), and the improved website impression test (I.W.I.T.), research

processes and results may supply a different viewpoint to consider website usability testing. In the research process, it is very difficult to discover whether the previous assumptions were correct. Because of this fact, more evidence and discussions can help this study to explore the importance of emotional design in website design.

The motions and the spent navigation, which result from animations, have a great influence and are different from traditional design concepts. For example, some navigation icons are designed by Flash; if users do not have this software, they cannot proceed to the next web page. Some websites are designed with multi functions but the lower loading time influences the users' emotion. In the test process, some participants dislike websites which contain too much Flash design. This may result from unsuitable or unnecessary Flash design. Moreover, much website design is 'designing for the unknown': unknown users, unknown platforms, unknown browsers, and so on. Actually, many considerations need to be noted in the web design process. These variable website design elements are challenging web designers at present. To set participants near the real target audience is very important for exploring the real world in this study.

> Becoming a good web designer requires a solid understanding of the web envirounment in order to anticipate and plan for these shifting variables. Eventually, you'll develop a feel for it (Niederst, 2001: 37).

This 'feel' may be called emotional design for web designers. This feel needs to approach as close as possible to the real users.

Due to the web development having a great relevance to the development of technology, website design exerts a stronger influence in this field than other designs. For example, dynamic web design can be built by software more easily than before. New functions or new design methods will be directly reflected in the design outcome. These design factors have a strong relevance when building an effective website. User testing is normally used to evaluate product design and usability. This method might not be enough to build an affective website or to consider all of the relevant details of website design. Thus, it is necessary to search for a method of evaluating user's emotions in the website design process. Developing this method can help web designers correctly and efficiently to judge the user's intention and considerations in the design process in order to obtain a better design outcome.

The Web is currently changing our daily life. From life behaviour to social

communications, this development is difficult to limit to one or two research areas. Through the understanding of different research fields, website design can better approach users' demands. Many people also worry that their children may receive much unsuitable information from the Internet. The companies offering search engines should take more responsibility in order to improve the web environment not only to design 'over 18s' and 'under 18s' sites to classify web users. To combat this social problem, many methods can be used to improve this situation. Although it gives people a convenient environment, people should consider its negative influence that might bring health damage, such as unknown damages from the wireless environment or environmental pollution in order to obtain better results in developing the web. In addition, web development is going further and faster than the development of the law. The individuals are facing this problem at present. This problem may be better controlled in the future.

If website design is not only limited to visual performance or functionality, design can play a more important role in this development. It can be considered in the web environment (like architectural or environmental design) or developed in the user-centered design dynamic websites for individuals. These considerations can help website design to play a more important role in future web development. In the history of design, the research into design still has a shorter history than that into many subjects, not to mention website design. Although building a website is not a difficult thing for many people, building a professional website still remains a challenge and involves many considerations for web designers or similar people. In discussing the visual performance, it is difficult not to consider aesthetics. In discussing functionality, it is difficult not to consider interface design-UCD Design, and HCI Design in the design process. To supply a quick loading time, multi-functions, graceful visual performances, readability, efficient navigation, good content and classification, and the on time upgrade of the web content are the basic aims when building a professional website. These considerations have been considered by web designers in the design process already. The original idea still plays a very important role whether users desire a website or not. In other words, this sort of like or dislike belongs to content, which influence users' emotions. Emotional design can help website design to improve design problems and let the design outcome stand at a higher level. The key design point for web designers is that it lets users stay longer on the website and take more from the website.

Website design covers a great number of different research fields. The technological development helps web designers to create more possibilities in website design but

also adds more challenges in the design process. Dynamic website development efficiently supplies a brand research field for designers to create pleasure and fun for web users. Sound may be a new research field to supply disabled people with a convenient web environment. An American company-Sound System Company has developed a sort of software specifically to distinguish users' voices in order to select the correct options on technical devices. This development may have the potential to change the outlook of products and users' behaviour in the future. Moreover, past navigation considerations should be focused on in order to enhance web usability. Furthermore, many variable web design factors are strict challenges for designers. Today, website design still contains many unknown elements which strongly influence its design outcome, like browser usage, platforms, user preferences, window size, connection speed, computer speed, colour support, software support, font support, and device support, although the original design idea still plays an important role in website design, as in other design fields.

> HOME: There are four main reasons users return to some websites and not to other websites. They are high-quality content, often updated, minimal download time, and ease of use (Nielsen, 2000a: 380).

Furthermore, Travis (2000) conducted a web survey about web usability. This research used a target audience of 8,600 participants. The result shows that high quality of content, easy interface design, low loading time, and updating of information on the website are the four main reasons why web users return to well designed websites often. The high web hit rates are not equal to obtaining high conversion rates. Enhancing the conversion rate should be the aim for web designers. Enhancing users' positive emotion may be a solution. In the design process, the aims of web usability are to create positive emotion-confident, convenient, and comfort for web users. Since web users belong to the invisible target audience and have more choices on the Internet, to search for users' demands is more complicated and difficult than product design. Fulfilling user's expectations about websites can help designers and researchers to discover more design problems with website design. To adopt user usability testing, usability can be enhanced by this method and broken links, other interface problems, and the basic emotional responses regarding usability can be searched out by the participants. The problem is that user's demands and expectations cannot easily be figured out only through user usability testing. Web surveys can sometimes reflect users' demands more than the results of user usability testing. Both user's demand and expectations are very important when building real UCD websites for users.

Website design should have a different direction for developing emotional design in order to design for the three levels in the web design process. 'The 3C concept' should be considered in the design process in order to create appropriate design outcomes for users. Furthermore, the dynamic web design development should be clearly considered in the design process.

> Multimedia effects should be used only when they truly add to the user's understanding of the information. Remove graphic; increase traffic. It's that simple (Nielsen, 2000a: 46).

Interface design, loading speed, and navigation can directly reflect web usability for users. Nielsen thinks that loading speed is the key point for websites. Travis's web survey can also agree with this perspective. This design factor may be the key point. To compare previous loading speed, it has increased rapidly in recent times. Most participants felt satisfied with the loading speed of the test websites used in the test process. This means that the performance in terms of loading speed has higher performance at present. In the design process, the improvement of technological development may allow web designers to put more dynamic effects in their design outcomes. Past navigation considerations are a new research area for website design and are worth discussing at present. Nielsen (2000a) also supplies a clear description about web usability testing in 'Design Web Usability (book's name)'. Norman (2004b: 17) states that attractive things work better, based on Kurosu and Kashimura's research. This concept points out why designers need to build better visual performance on their websites. To adopt better visual performance on web pages can also enhance usability. Norman (2004b: 19) states that: 'Cognition and affect, understanding and evaluation-together they form a powerful team'. What kinds of emotion should be created in web design outcome for users? How can designers approach this target?

> Positive emotions are as important as negative ones-positive emotions are critical to learning, curiosity, and creative thought, and today research is turning toward this dimension (Norman, 2004b: 19).

To understand users' negative emotions can supply a better solution for design problems. Both users' likes and dislikes are important when exploring the role of emotional design.

1.2 The organization and outline of the thesis

This thesis is divided into eight chapters which provide introduction, literature review, initial pilot test (I.P.T.), methodology, data analysis and test results, research outcomes - the website design reference model and the website impression test system, validation of the research outcomes, and conclusions and recommendations. In addition, the appendices of the thesis consist of the individual statistics of the mean values and standard deviations for the initial pilot test (I.P.T.), the results of the participants' protocol data for the website impression test (W.I.T.), the results of Emotional Probes testing for the website impression test (W.I.T.), and the research DVD-Rom. This research involved a literature review, the initial pilot test (I.P.T.), the second pilot test (S.P.T.), the website impression test (W.I.T.), and the improved website impression test (I.W.I.T.). Sixty-eight participants participated in the test process.

The chapter-data analysis and test results aimed to analyze the results and research findings of the website impression test (W.I.T.). The main purpose is to create a website design reference model in order to produce a website which can meet the requirements of the research results and the further emotional design in website design at the next research stage. This chapter consisted of the analysis strategy, the results of the participants' protocol data, the results of Emotional Probes testing, and the results of the questionnaires. The research outcomes consisted of the fashion website design reference model, the insurance website design reference model, and the website impression test system. After conducting the discussion on the proposed detecting methods, the improvements to the website impression test (W.I.T.) can supply a clearer classification of the Emotional Probes testing and questionnaires. The research outcomes contain the fashion website design reference model, the insurance website design reference model, and the website impression test system. After conducting the website impression test (W.I.T.) and the improved website impression test (I.W.I.T.), many valuable experiences were obtained in order to supply further findings in this research field. Validation of the research outcomes consisted of discussions about construction of the prototype website and the fashion website design reference model and the validation of the prototype website and the website impression test system. Finally, the conclusions and recommendations consisted of the reflective evaluation of the research process, the results of the research outcome, and future research and recommendations. Figure 1.1 shows a flow diagram of research tools.

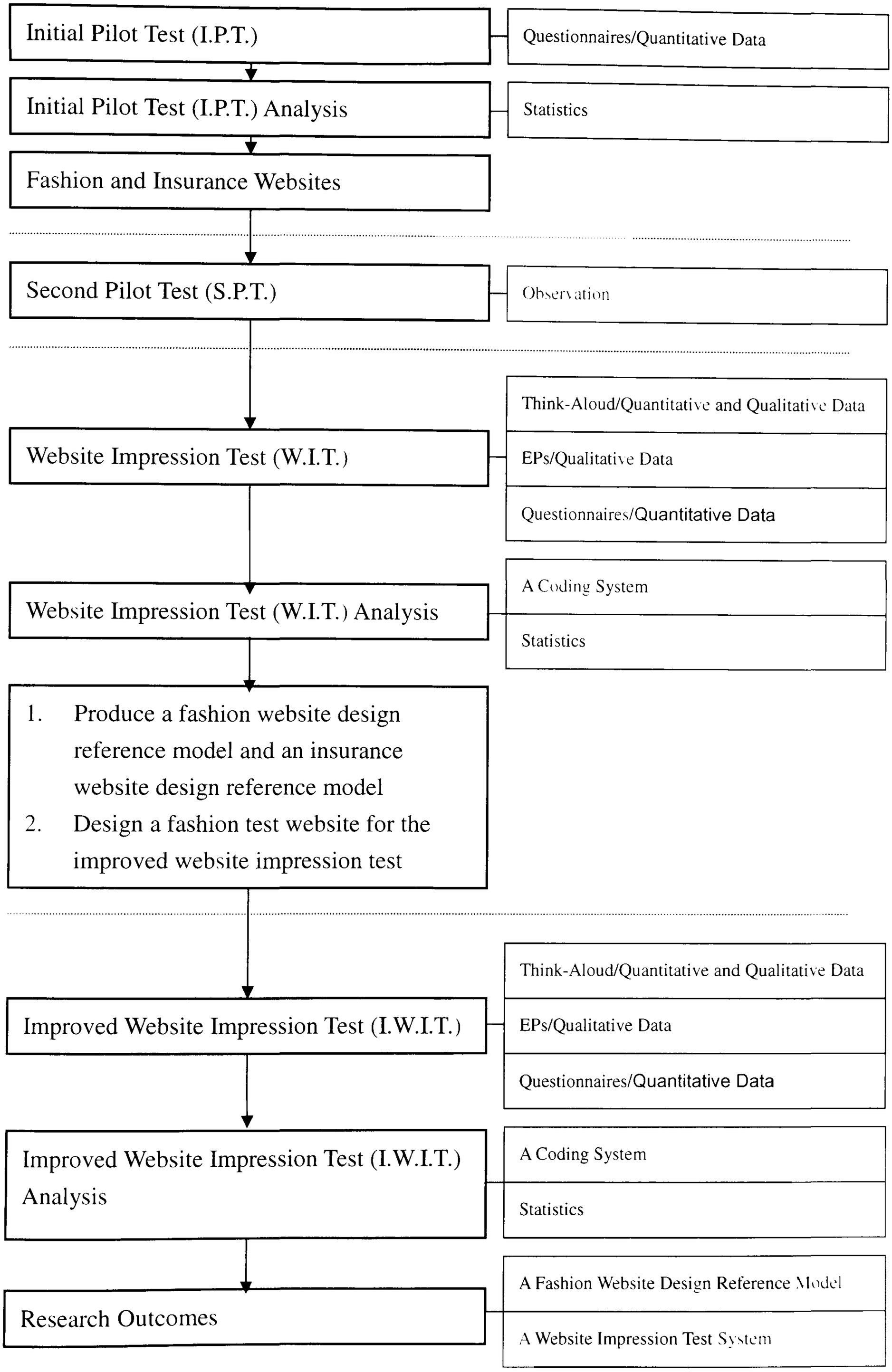


Figure 1.1 flow diagram of research tools used

1.3 Research timetable

Gantt chart

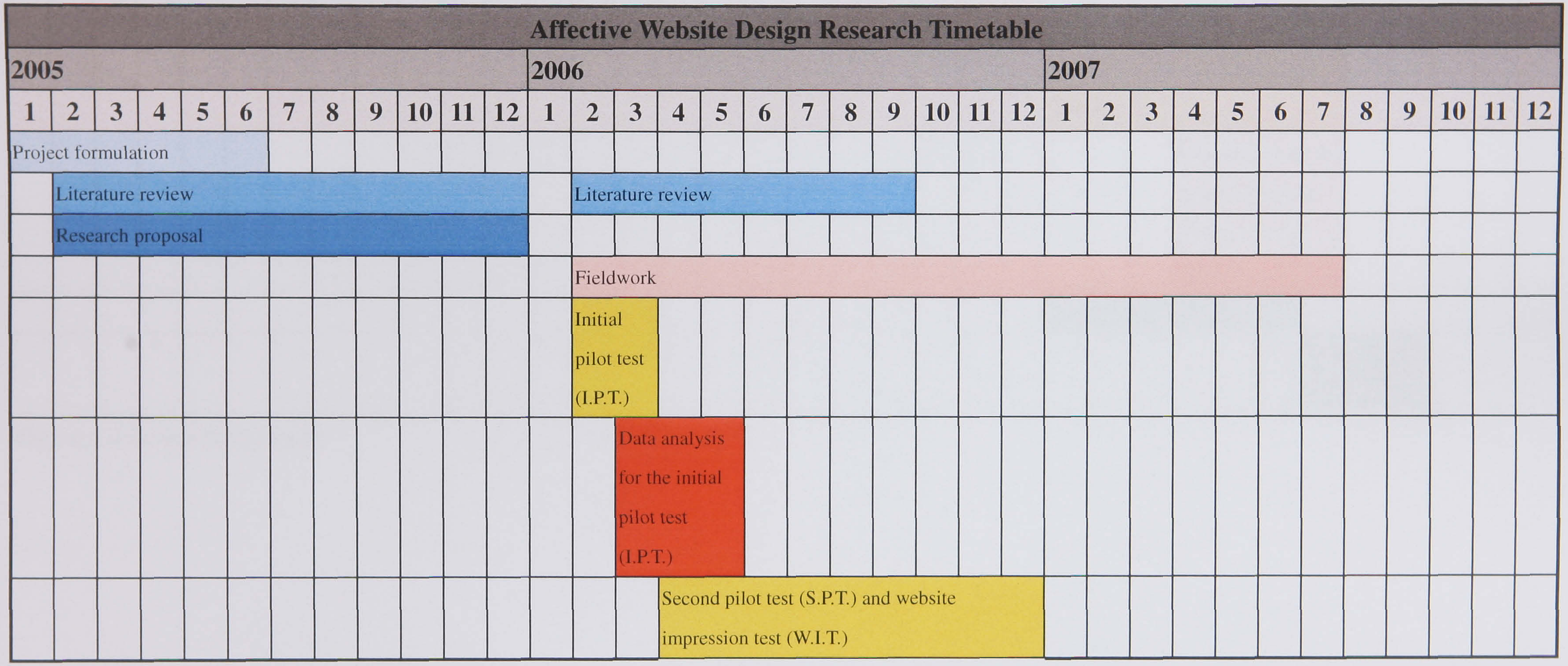


Figure 1.2 research timetable

Chapter 2 Literature Review

2.1 Introduction

This literature review identifies a wide range of studies in the related literature regarding emotional design and website design. It comprises website design, graphic deign, and emotional design. The aims of the literature review are to acquire knowledge about website design and to search for an appropriate methodology for website design. The studies of books, journals, and Internet information were divided into five parts, covering design methods, design issues, the behaviour of web users, the necessary design rationale and considerations for website design, and the future development and challenges for website design. In the subsequent sections, these areas of study will be discussed in terms of their relevance to this research.

The initial studies of books, journals, and on line information are broadly classified into five main sections. To avoid the situation that the development of a detecting system might be far away from the real world, it is necessary to adopt successful designers' opinions and their valuable experiences in order to obtain a better solution that can approach the requirements of both website design and individuals. In addition, designers also need to consider the influences on different cultures. Once a website has been published on the Internet, it also becomes a sort of global product. Through necessary culture studies and their own experience and understanding, designers may be able to control this difference to an acceptable level. Finally, utilities and their limitations are also considered in this research, since there is room for the development of website design in order to provide basic guidelines through models for researchers and designers to create websites and solve design problems efficiently.

Travis (2000) conducted research into web usability, using a survey of 8600 people. The results show that high quality of content, easy interface design, low loading time, and updating of information on the website are the four main reasons for web users to return to well designed websites often.

2.2 Design Methods

2.2.1 Graphic design

This part is focused on design methods. It consists of the influences of visual research and graphic design, website design, and emotional design. In this way, it is possible to

identify their importance regarding website design and search for improvements to solve basic design problems. Many different specialisms are involved in the development of website design; the first step is to adopt three main design elements that are relevant to website design and discuss their roles.

Noble and Bestley (2005: 30-41) introduce a transferable research model used in Matt Cooke's project. This project explores an unusual approach to the role of the designer in responding to a brief from a client. Rather than creating a series of visual proposals and variations of design solutions, Cooke decided to concentrate on developing a working methodology for his client-a UK based cancer awareness charity. Cooke's project presents a rationale for a method of visual thinking which is based on a schematic diagram of the design process, together with a step-by-step, transferable system for the construction and testing of a range of public information products. In the website design field, many companies also have their own workflows to establish their basic design projects. Moreover, many website design books introduce many different workflows concern about website design for readers. Because website design is more complicated than other design fields, this sort of method can supply a step by step way to think about the project development and avoid making unnecessary mistakes during the design process. This method is classified into four stages: definition, divergence, transformation, and convergence. Moreover, his working methodology is similar to the stages of the oriental design concept. The oriental concept used in literature and art is also divided into the process of Definition, the process of Divergence, the process of Transformation, and the process of Convergence. Many different sorts of creative cover the learning process and their impressions also follow this rule of development in oriental society.

> The South American design educator and writer Jorge Frascara has written that: …the design of the design method and the design of the research method are tasks of a higher order than the design communications (Noble and Bestley 2005: 30).

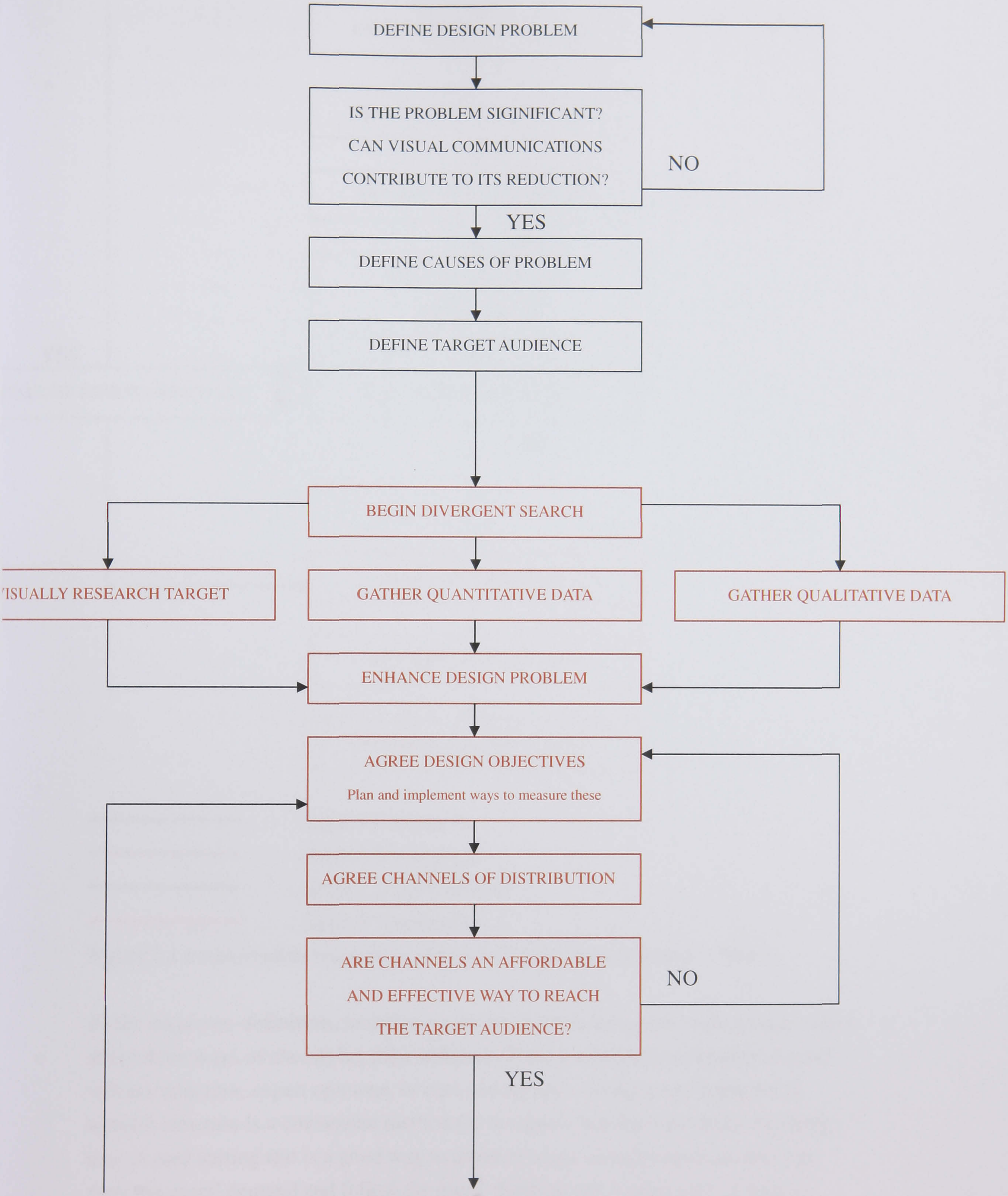
'Good graphic design is not simply a result of brilliant execution of technique. It is the strong expression of clever ideas' (Dabner, 2004: 110). Research is often the key to successful projects'. Designers are constantly surrounded by digital images, sounds, and animations. It is essential for designers to have an awareness of what is going on around them. For example, market research leads directly into early conceptual design thinking because this information will help designers to understand who are the target audiences, their likes and dislikes. Design outcomes need to communicate with the

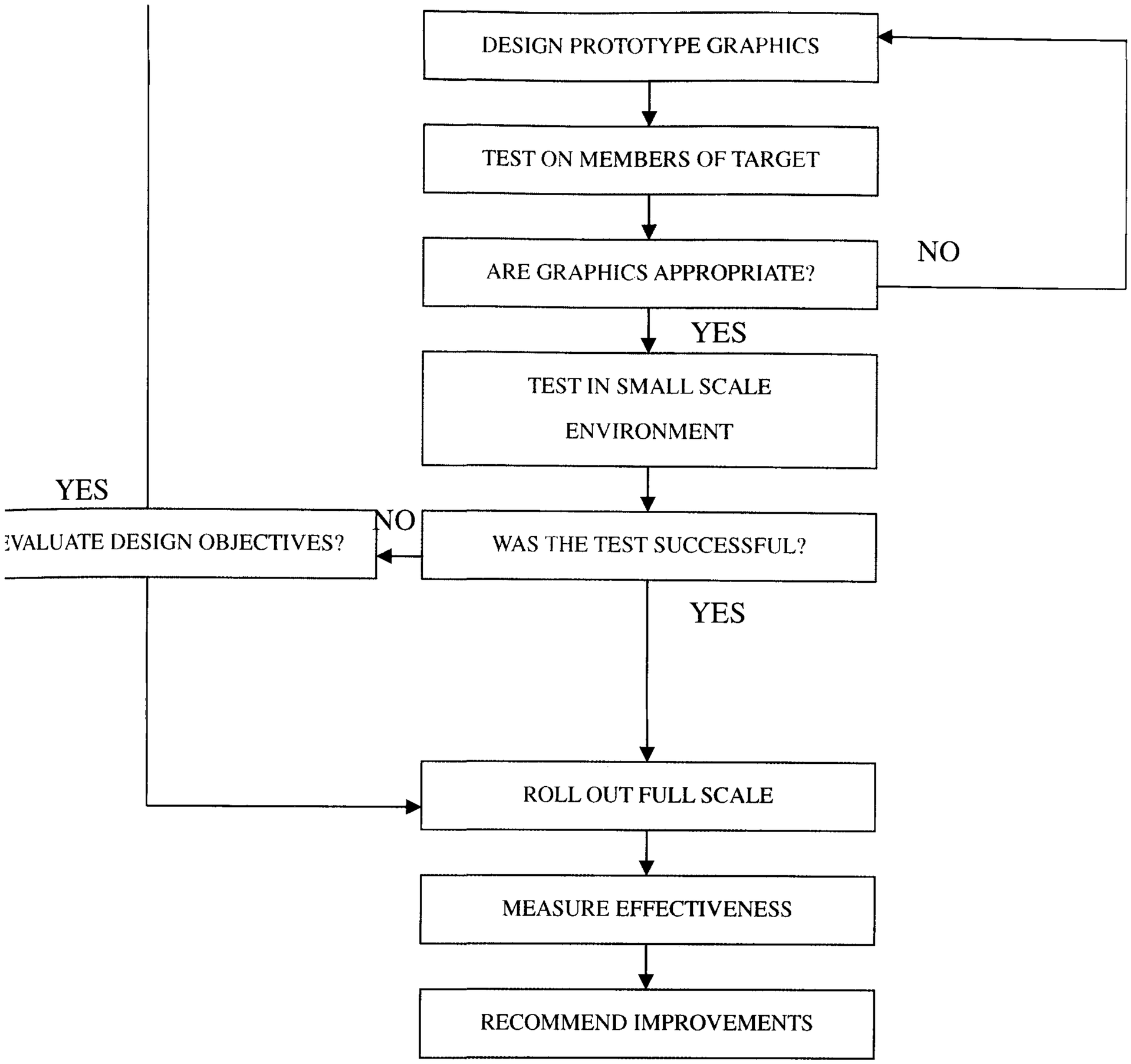
target audience but designers normally do not meet the target audience face to face.

> The drive towards a more social agenda for graphic design reached its height during the late 1990s with the reissuing of the First Things First manifesto. This call for a refocusing of the designer's role indicates a need for more considered discussion of the function and purpose of graphic design. Part of this discussion has been to explore how design might operate more effectively with a more methodological approach, achieved through the exploration of key aspects of the process of design thinking and making (Noble and Bestley , 2005: 30).

A similar situation also arises regarding website development. Website design may not follow the complicated rules of graphic design that need to establish different meanings for different graphic design work but the graphic design area still plays an important role in some web pages. Graphic design cannot supply all guidelines for website design in visual performance. For functional considerations, web designers need to adopt different viewpoints to consider the role of graphic design in website design. For examples, icons may be better designed as normal and acceptable in order to reduce users' misunderstanding. Image choices may be better based on the user's scanning habits, in order to reduce their annoyance. Cooke developed a working method from marketing and advertising. This method can also meet the requirement of commerce; for instance, it could create a successful solution to the brief. This project and its solution are very important for the design process. The design process was essential for the success of this project. Involving the testing of many proposed visuals, the gathering of the target audience feedback, and surveys as well as traditional graphic design methods and principles, this method could be applied to alternative problems within the similar field.

In the website design field, both image choices and the quality of images are very important in its graphic design. Image choices play an important role for creating atmosphere for users. The quality of images will influence the quality of website dramatically. Figure 2.1 supplies a solution for designers to determine website graphic design.


DEFINE DESIGN PROBLEM
IS THE PROBLEM SIGINIFICANT?
CAN VISUAL COMMUNICATIONS
CONTRIBUTE TO ITS REDUCTION?
NO
YES
DEFINE CAUSES OF PROBLEM
DEFINE TARGET AUDIENCE
BEGIN DIVERGENT SEARCH
ISUALLY RESEARCH TARGET
GATHER QUANTITATIVE DATA
GATHER QUALITATIVE DATA
ENHANCE DESIGN PROBLEM
AGREE DESIGN OBJECTIVES
Plan and implement ways to measure these
AGREE CHANNELS OF DISTRIBUTION
ARE CHANNELS AN AFFORDABLE
AND EFFECTIVE WAY TO REACH
THE TARGET AUDIENCE?
NO
YES



Stage 1 Definition

Stage 2 Divergence

Stage 3 Transformation

Stage 4 Convergence

Figure 2.1 a transferable research model (from Matt Cooke's project, 1990s)

At the stage one-**definition**, to define a website at the initial stage, web designers may adopt three ways of classifying their websites. They use previous examples of good website structure, expert opinions, or card sorting tests. Using good examples of website structure is a convenient method for designers but does not create anything new. A card sorting test is a good way to develop a new website structure that can meet the users' demand and follow the users' thinking but it takes a lot of time to establish a new logical thinking. However, introducing new types of structure which users need to learn how to use throws up the possibility of increased function. Thus it

is still worth doing research into this field. Final method is to adopt expert opinions from other professional areas outside that of website design. The main reason for using this method is that different types of website have different target audiences but web designers are not always expert in all areas.

The **divergent** stage is also an attempt to get know the target audience; to understand their likes and dislikes (emotional design is considered at this stage); to find out what motivates and stimulates them. As part of the divergent search, the design team should pursue three main avenues: gathering quantitative data; gathering qualitative data; and visually researching the target audience. In other words, this stage mainly searches different opinions about the stage one definition in order to increase the research possibilities.

The different stages of website design can be classified into visual considerations, usability, and variable design elements. Images, colour, layout, and the performance of text belong to visual considerations. Dynamic areas like flash or animation areas, navigation, and eye motion line design belong to usability. Finally, many variable design elements also need to be considered at the divergent stage.

At the **transformation** stage, having conducted the divergent research, the design team has in its hands the raw material which, when filtered through its collective imagination, and sharpened by its design experience, evolves into a set of proposed design solutions. At this point, the design team draws on its understanding of the results of the divergent search and applies them to its knowledge of design. As we know, website design also refers to many different types of knowledge.

> Faced with the dilemma of varying browser capabilities, web designers have developed a variety of design approaches, some more extreme than others (Niederst, 1999: 9).

This means that to transfer some existing information or knowledge into the website design area entails fulfilling certain requirements. Not only browser capabilities, but also many variable design elements involves fulfilling certain requirements in order to transfer them into a website design. This is the process of Transformation. The design team is trying to effect a change in human understanding, this means designers communicate their thoughts with the target audience, and the knowledge gained in the preceding stages gives them a greater chance of achieving this. It is essential that lessons have been learned by the design team and that they do not simply revert to

personal styles, or comfort themselves by aping current directions. At the transformation stage, the design team examines the motivations behind any proposed solutions. The third section, transformation, presents the development and testing of a series of potential solutions. These experiments can be tested by the target audience or focus groups in order to generate their feedback on a range of criteria. By testing each of these essential elements separately, the designer can obtain more specific and detailed feedback from the target audience in order to develop their design. To enhance usability in website design plays an important role in transferring or creating positive emotion for web users. The web design problems concerning interface design and navigation should be tested and tested again. The advantages of following this method are to find real problems in navigation and to accommodate users' behaviour.

At the **convergence** stage, background research has been conducted, the design objectives have been agreed, and the channels of distribution assessed and the prototype designs have been narrowed down. The challenges for web designers at this stage are how to get useful feedback from the invisible target audiences, how to enhance the conversion rate and how to maintain the website or upgrade the content. Although website design and graphic design have different focuses, image considerations in website design are the essential means of maintaining quality. To transfer particular meanings for the target audience, both of them have similar characteristics. This kind of self-perpetuating system is very necessary for designers to control the design outcome to a high quality level. Moreover, this sort of self-perpetuating system which follows the basic deign process is easy for designers to use and understand as it is in the form of a to do list.

Matt Cooke's project seems to follow traditional oriental philosophy. This sort of concept, from definition to convergence, is widely used in oriental society. It remains a strong influence even today. This concept is emphasized in the learning process within oriental creative arts. It can be discussed in a narrow sense, like the simple skill of Chinese painting or a wider sense in the kind of thinking used in creating literature or art.

The oriental design rationale can be divided into three areas for discussion: the order of design rationale, the narration of design rationale, and the pattern of design rationale. The similarities between Matt Cooke's project and the oriental design rationale are observed in these stages but the main difference is that the oriental design rationale cannot supply visible and clear processes for designers, as part of the process remains at the spiritual level. These sorts of oriental design rationales always

emphasise that insight is more important than outlook, so it is difficult to solve design problems or to organize their development clearly.

'Japanese graphic design and agriculture design stimulated western culture to develop Nouveau' (Wang, 2004: 356). Japanese influence is hard to ignore in the development of graphic design. On the one hand, the Japanese devoted their efforts to connecting their design to the world. On the other hand, they still reserved their culture to develop a kind of unique style of design. This difference maintains a balance point for western culture and eastern culture and is very necessary for the future development of design. It is also very important for website design. A website is a sort of global product, using images and texts to transfer some particular meaning for users, but it still has difficulties in communicating to people all over the world. For example, some design outcomes have different meanings in different cultures. How to lessen these kinds of differences or to develop global thinking in design may be a new key role in the development of design.

Wang (2004: 388) evaluates the influences of the development of computers on graphic design. His opinion is that is difficult to judge whether the development of computers can contribute to the development of graphic design in a good way because this kind of quick development can effect quality. People can easily create a design outcome without any cost by using computer software to copy or to duplicate items in a short period of time. This convenience may, however, cause designers to over-emphasize the visual effects, and ignore the basic thinking about their work. The inner spirit of design should be carefully preserved in this time of innovation. The same problem also appears in the development of website design or other media design. By this development, computers and software play a complicated role in graphic design or other areas of design. By adding sound and animation to traditional graphic design, the situation becomes very complicated for designers to control. It might be necessary to set a model or system to help designers to control their performance while working electronically. Through using Frontpage and Dreamweaver, people can create websites without learning the necessary information or thinking about design essentials in advance. The result is often poor visual performance because website production is free. Many people can build their websites through Frontpage without learning any advanced skills or design concepts. Some people think that the function and the content of web pages is more important than their visual appearance, this thinking is unlikely to fulfill the requirements of commerce. This problem in websites is more serious than graphic design because of the spread rate of the Internet. In addition, over emphasizing the functionality of

website design and the effects on web pages makes it easy to lose the key focus of the web pages. Many tutorials concerning website design emphasize one or two stunning effects, but actually cannot supply the understanding for users to set up a suitable method for developing their website design. The fact is that people do not know how to classify their data efficiently on web pages, how to establish better visual performance or better interface design, and how to provide better navigation. These are key problems that need to be solved.

Norman (1998: 188 and 189) defines seven principles for transforming difficult tasks into simple ones. These principles of purism are show below.

1. Use both knowledge in the world and the knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the gulfs of Execution and Evaluation.
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize.

It is necessary that research is conducted on the target audience for a particular message in order to ascertain the quality and appropriateness of the materials used and the visual language adopted, together with the range of contexts within which the work can be viewed and interpreted. Mapping meaning is an accepted part of everyday life and for most people, they are simply a graphic representations of space. This method has an unquestioned truth, a reality. It is not far away from the users' behaviour. This concept, image of maps, is also emphasized in website design. A sitemap is often used in web design.

For a website to function effectively, it is very important for designers to establish a higher usability in their design outcomes. It is difficult to lay down rules about which design factors can be used because it depends on the designers' original ideas and experiences. But clearly to transfer direct meanings to audiences, rules are necessary for website design outcomes.

Niederst (2001: 50) stated some rules about web target audience considerations. They are primary audience considerations, guidelines of Internet savvy, guidelines of technical savvy, average users' connection speed, platform considerations, and browser use considerations. The most important thing is 'How often do you expect

them to visit your site?' and 'How long will they stay on an average visit?'. The final concept points out that high conversion rate plays a key role in maintaining website development.

'A web designer needs to consider the user's experience of "moving through" the site' (Nideset, 2001: 313). This is the main users' behaviour in using websites. User's eye motion has a great relevance for web layout.

In website design, website usability and website content considerations should play higher roles than transferring messages to the public. The relationship between users and the designer's message should considered in the website design process continuously. Different sorts of websites have different target audiences and aims. This design problem needs to be considered at the first stage of the design process and also to be extended in the subsequent stages. Web users do not often send their feedback to web designers directly in order to improve the website. Moreover, many websites do not have direct processes or efficient methods to deal with users' problems. The next problem is that users still have many choices on the Internet. To transfer invisible users into visible users might be a valuable tool to supply more comments for designers to improve the quality of their websites rather than only using testing. Many papers on visual research discuss or explore the relationship between designers and audiences. A difficult design problem for visual research is how to measure its influence or its effect on audiences. In addition, sound and animation also influence users dramatically. Both of them also arise in the website design process. Since Buswell used 'Tsunami' images to investigate or to measure audience's movements or starting points, this sort of visual research explores new thoughts about visual thinking for designers. Does its result cover all audiences without any exceptions? The answer is definitely 'No' because differences between individuals is the normal situation. Will universal principles or rules lose their value because of these exceptions? The answer is also 'No'. These basic rules and guidelines still have their values to help designers to approach their tasks or to solve design problems.

If web designers can develop a method to measure the proportions of influence in animation, images, sound, and texts to audiences, this can help web designers to arrange these design elements efficiently in their design outcomes. Web designers can use this sort of scientific method to establish the focus in order to obtain their audiences' attentions. This topic can be called affective research. The advantage of using this method is that web designers can efficiently arrange the key points of web pages in order to satisfy user's demands.

2.2.2 Website design

This section mainly discusses the current website design methods in order to supply essential background information for constructing a test website. The aim is to compare the advantages and disadvantages of these systems in order to search for solutions for evaluating design problems. Itzkovitch and Till (2003: 15 to 27) used their own experiences to develop a step-by-step design method in order to perform their web design tasks. This method is shown in figure 2.2.

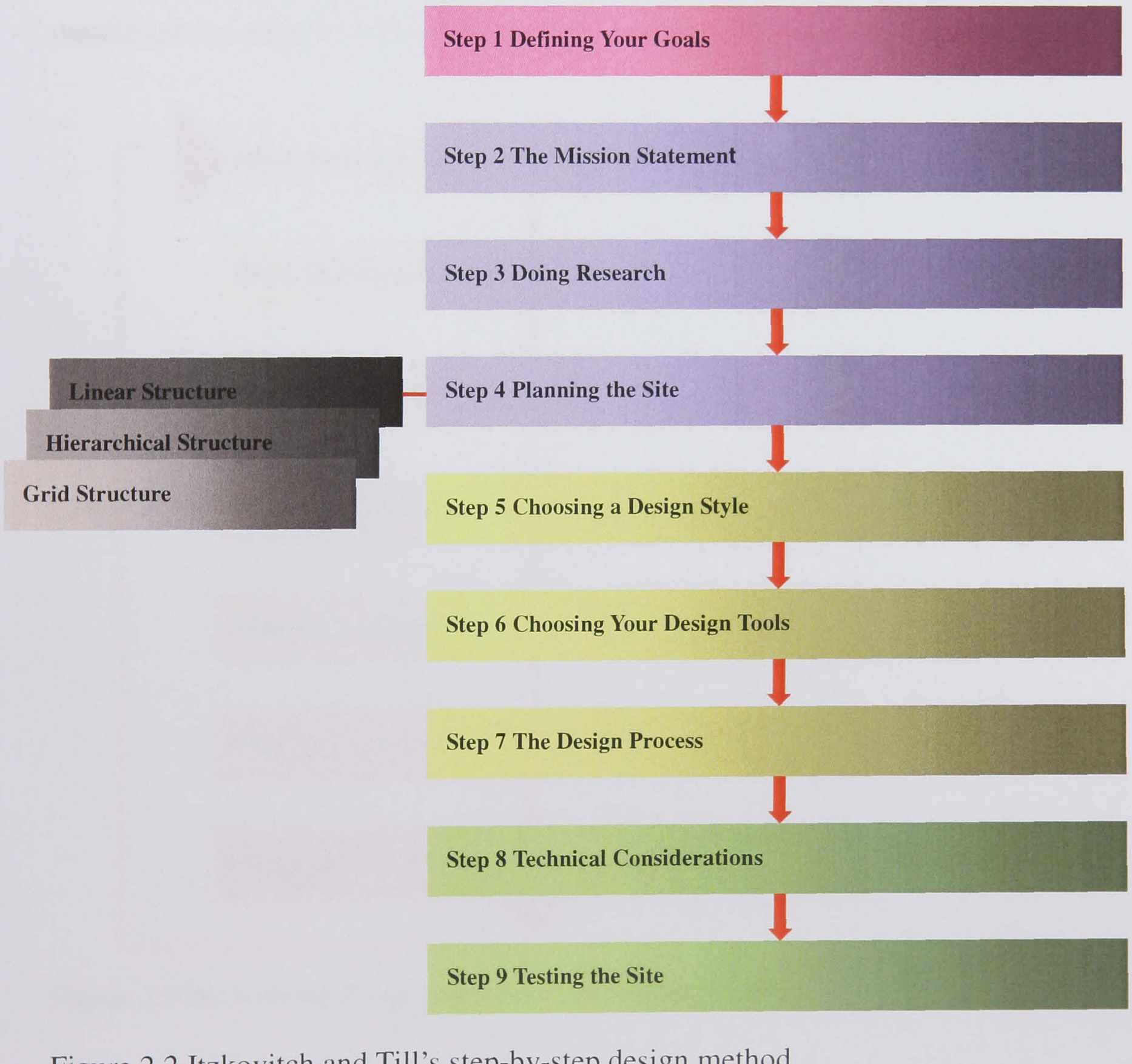


Figure 2.2 Itzkovitch and Till's step-by-step design method

Lynch and Horton (2001: 146) offer another method of the website design process, shown in table 2.3 below.

Table 2.3 the processes of developing a website (from Lynch and Horton, 2001)

1. Site definition and budgeting
2. Information architecture
3. Site design
4. Site construction
5. Site marketing
6. Tracking and evaluation

Many books concerning web design processes generally follow this form, and it is vital for professional web designers to have this knowledge. Niederst (2001: 49) supplied seven phases for the website design process shown below in figure 2.4.

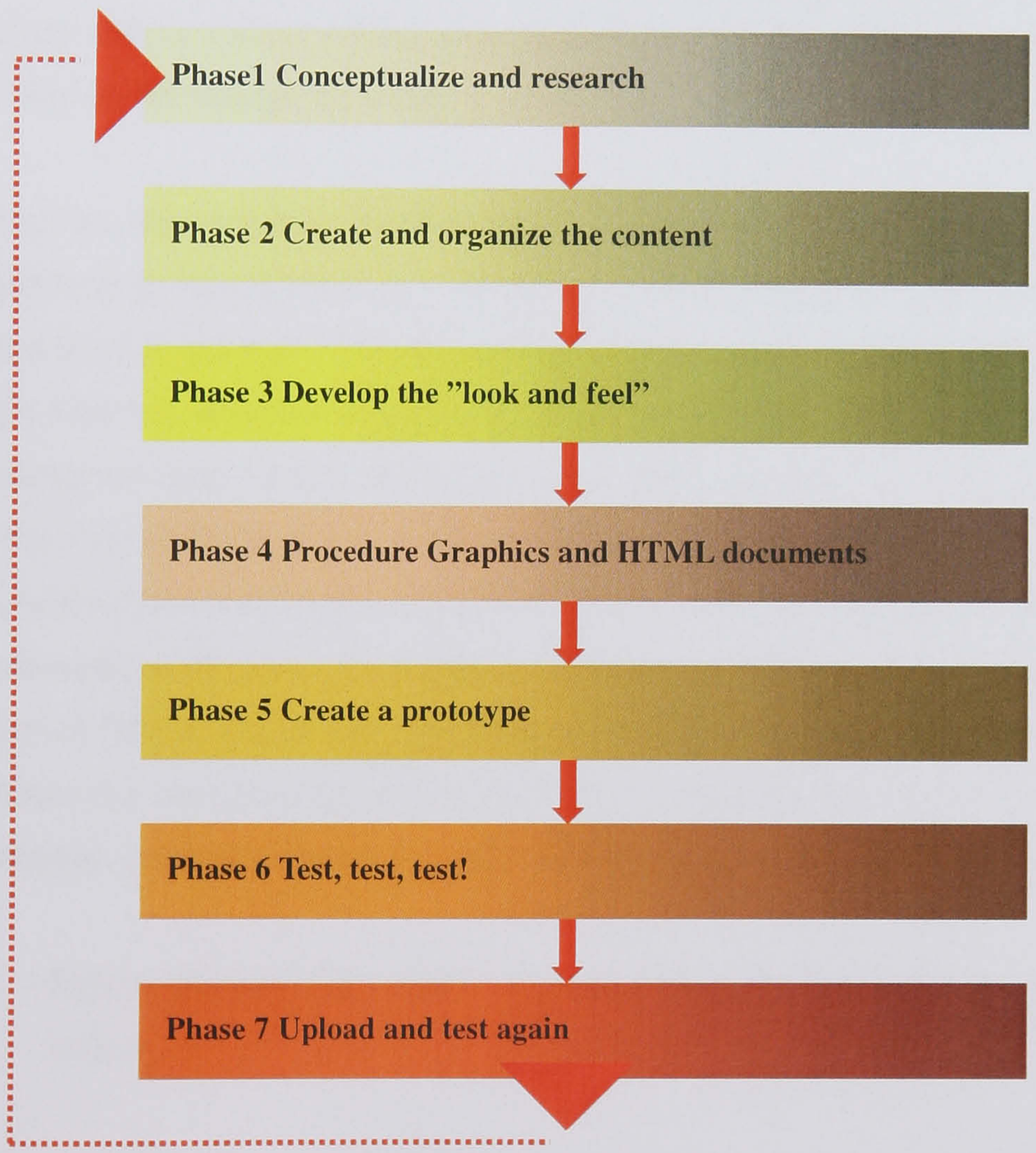


Figure 2.4 the website design process (from Niederst, 2001)

> Of course, depending on the nature and scale of the site, these steps will vary in proportion, sequence, and number of people required, but in essence, they are a necessary journey for the creation of a site (Niederst 2001: 49).

At step one-**defining your goals**, when creating a website, the temptation is to

immediately define the website "should own" characteristics. This basic definition can help to narrow down the research field and adopt the expert's experience. Moreover, user's emotions can be considered at this step. This approach ignores at the outset a crucial factor: the aims of your website. It follows that such an approach might result in an inappropriate design. If people begin, instead, by focusing on what the website is about and on its objectives, the appropriate design style should follow naturally.

At this first stage, considering the unique qualities of the Internet is very important in defining the aims of each website. The website classification and the target audiences can be decided and discussed at this stage. To establish an original idea is very important at the initial stage. In addition, to outline the basic approach to website structure and to collect useful information can help web designers to engage in the next step in the design process.

At step two-**the mission statement** for a website project, it is necessary to outline the prospective achievements in a sentence or short paragraph known as a mission statement or to do list. This step shows that website design covers many different design sources, and that designers should make a checklist in order to avoid making too many mistakes in the design process. This checklist may be designed by a step-by-step method or a table in order to deal with many different design sources. A mission statement might be concise and clearly defined and summarize what the web designers are trying to achieve. Setting out a mission statement is a very important part of the design process, even though it does not, in itself, directly influence the construction of the website. During this period of time, designers also can supply some information to the clients and get their feedback.

Itzkovitch and Till (2003: 15) show five key points in the second stage shown below.

1. Review the goals that the designers set up in step one.
2. As far as possible at this point in the process, write down how you intend to achieve your goals with specific features on the site. Include even obvious points.
3. Write down any limitations the designers may have.
4. Attempt to set out a schedule for when (and if) each of the goals can be achieved.
5. With the preceding points in mind, write out the designers' mission

statement.

The second step belongs to the transformation stage. Designers are eager to search for any possibilities and limitations. This influence may belong to the target audiences or the clients.

The third step-**conceptualize and research** belongs to the transformation stage. To adopt experts' opinions and to make some decisions are very important at this step. Any possibilities can be considered at this stage. The designers have ascertained their goals and set out a mission statement, it is then time to consider the target audience and how to best reach them. The design problem - audiences and messages need to be considered. In addition, user's emotions and their influence need to be discussed. The appropriate design of a website depends on who will use it although there are many exceptions to this in the real world. Education, web experience, age, gender, location, and technological knowledge are all relevant factors. Figure 2.5 shows the essential information required about the target web users.

Figure 2.5 the essential information about web users (from Itzkovitch and Till, 2003)

Considering these essential elements can avoid designing unnecessary things for websites, and can improve the goal of the design task. 'Research is crucial in that it affects the overall direction your site will take' (Itzkovitch and Till, 2003: 17).

> Another type of testing that is important to perform is user testing. … … User testing is generally conducted as early in the production process as possible so changes can be made to the final site (Niderst, 2001: 55).

The website structure implies priority. The most prominently displayed pages of websites are the ones users will assume to be the most important. The fourth to the eighth step belong to the convergence stage. Website design covers many different

research fields. At step four-**planning the website**, adopting experts' experiences, comparing similar websites, or using a card sorting test can help designers to build a better website structure. These methods have their individual advantages and disadvantages. The decision depends on time, budget and validity.

Three different types of web structure are used currently: linear structure, hierarchical structure, and grid structure. These different website structures have their own individual advantages and disadvantages. In addition, a website map and the search function are widely used for navigating excellent websites. 'Web users normally will stay on one web page for between four and ten seconds unless doing intensive reading' (Wean, 2005: 1-4). It is very important to think logically about which pages will be accessible from each page of a website. Itzkovitch and Till (2003: 19) give a two-click rule, this is often a good solution, as shown below.

> Every page on a site should be accessible from every other page within two clicks. This ensures easy navigation through the website and a forthright presentation of all information (Itzkovitch and Till, 2003: 19).

Navigation considerations and interface design have a great relevance to web usability. The important thing is to decide a suitable website structure and its navigation with good interface design.

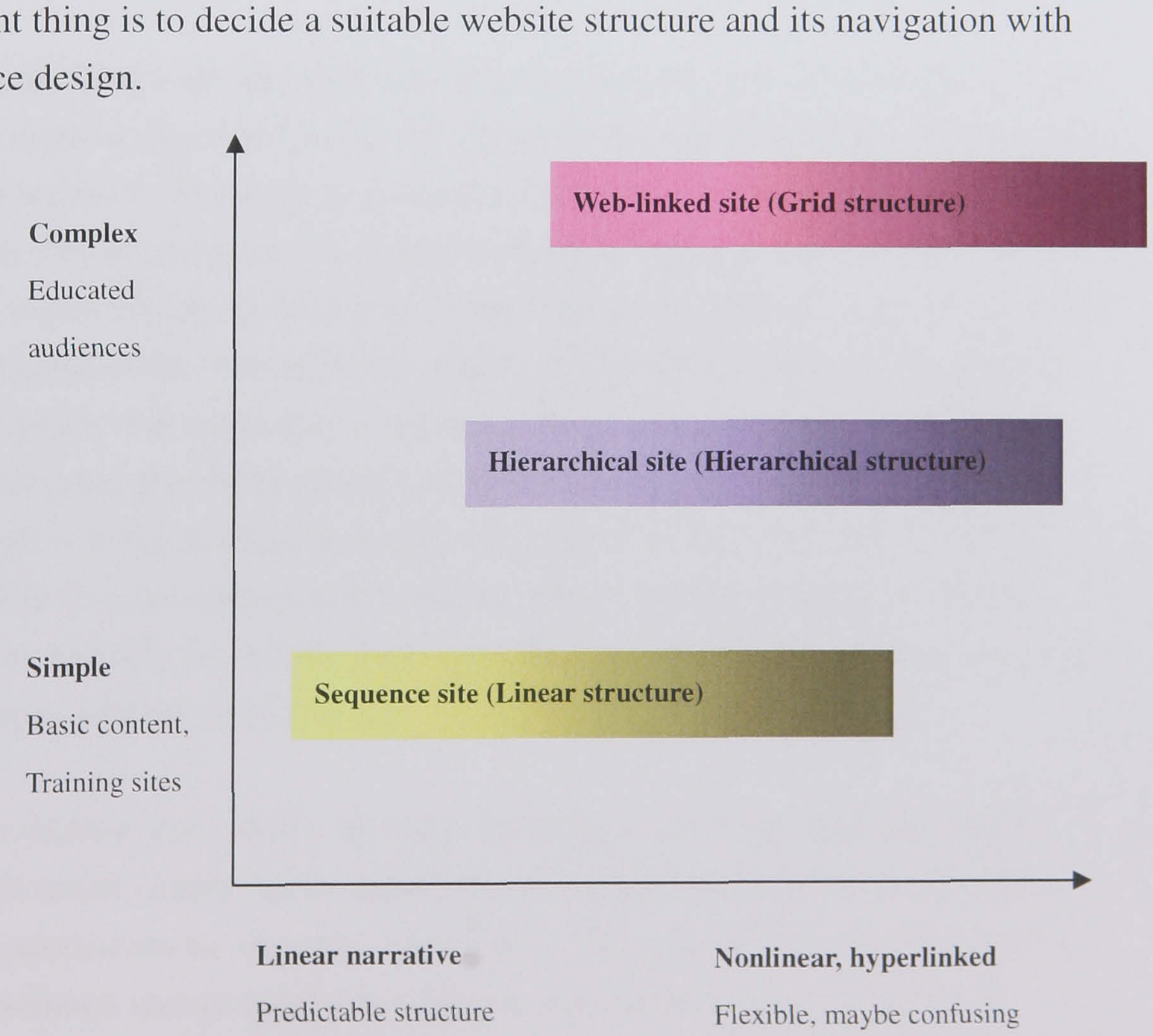


Figure 2.6 a chart to compare the 'linearity' of the narrative and the complexity of the

content (from Patrick J. Lynch and Sarah Horton, 2001)

Lynch and Horton (2001: 45) created a chart to compare three different types of website information structures. Most complex websites consist of all three types of information structures. Users are likely to use a website in a free-form web like manner, just as they would a reference book.

> But the nonlinear usage patterns typical of web surfers do not absolve you of the need to organize your thinking and present it within a clear, consistent format that complements your design goals (Lynch and Horton, 2001: 44 and 45).

The chart summarizes the three basic organization patterns against the 'linearity' of the narrative and the complexity of the content. In the design process, this consideration plays a key role in enhancing website usability. Many users have similar experiences, and often lose their way or direction when using websites. Some designers currently use website maps to avoid this situation which cause users to experience negative emotions. To address each web page's location clearly is essential for users.

At step five-**choosing a design style** (develop the look and feel), the design style of the website might be described as the feel it ends up having through the use of colour, imagery, and typeface. To establish a personal design style is not as easy as a painter's painting style. The main reason is that professional design is a sort of activity that belongs to a teamwork group. Moreover, many design outcomes should acknowledge the client's requirements. Although this stage can efficiently supply many different ideas for designers, this method also remains a dangerous area that can ruin their creativity. This point should be considered in the design process or in advance. Website design is a real product because users can see it but it cannot be touched. There still remains many differences between website design and product design. Invisible users, variable design elements, and the upgrade of website content are the main differences with product design.

> Don't impose style. Don't set out to develop a 'style' for your site, and be careful about simply importing the graphic elements of another website or print publication to 'decorate' your pages. The graphic and editorial style of your website should evolve as a natural consequence of consistent and appropriate handling of your content and page layout (Lynch and Horton. 2001:

111).

At step six-**choosing website design software**, design tools may be classified into three areas for discussion: graphic authoring software, interactivity or animation software, HTML, JAVA, and CSS authoring software. It should be remembered, however, that design tools are just that—tools. Creating a table that compares the advantages and disadvantages between these different sorts of software can help designers or learners to choose suitable software for designing their websites.

Niederst (2001) supplied some information about the comparisons of software in her book. The basic understanding of the advantages and disadvantages of different types of digital files is necessary for website designers. It can help designers to make better choices in order to decrease the loading time. Moreover, it also has a great relevance to visual performance. As well as colour use or website layout considerations, two strategies can be adopted for use.

At step seven-**the design process**, the basic design process is a sort of loop to solve design problems and approach the goal. The looped thinking is emphasized in the design process.

> Faced with the dilemma of varying browser capabilities, web designers have developed a variety of design approaches, some more extreme than others. The 'correct' way to handle a particular site, of course, depends on its use and audience, but this section should provide a peek into the different positions in the ongoing debate over where to draw the line (Niederst, 1999: 13).

The above paragraph shows that website design research should play a stronger role than merely the visual performance. Employing website usability and the user centred design concept to develop the design process should make it easier to obtain better design outcomes.

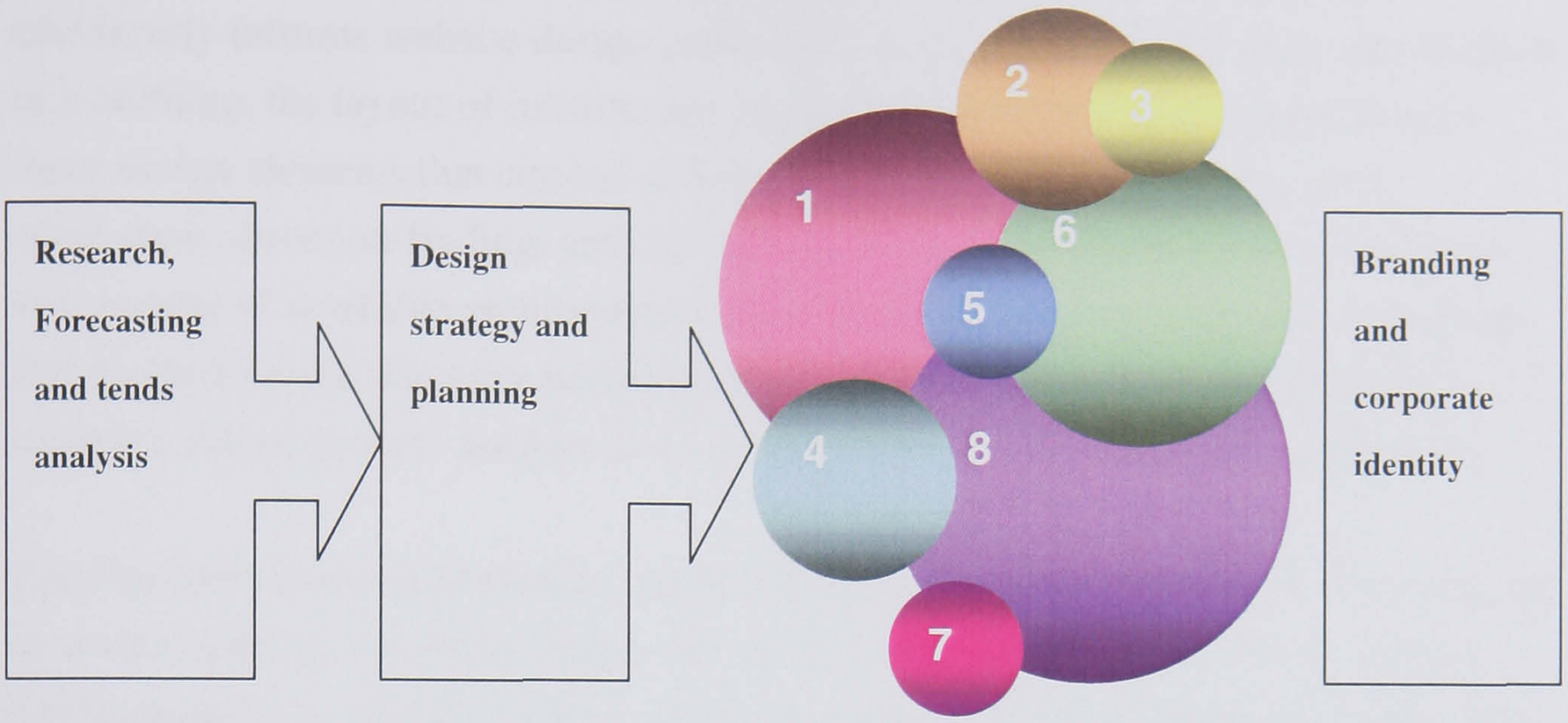
At step eight-**technical considerations**, it is necessary to consider two technical areas. These are software considerations and hardware considerations. This stage does not have solid models because these considerations will be evaluated by the development of technology. Current technical considerations might not be a problem tomorrow. This point has a series of repercussions that need to be considered. Actually, since web designers do not have any ability to improve technical problems, they should understand this consideration. Designers can use their current design IT skills to limit

their influence or to avoid the influence of hardware.

At step nine-**testing the website**, a central reason to test websites is to ensure there are no broken links. It is also very important to confirm that all function links actually lead to where they are supposed to. All internal and external links, including e-mail links should be tested. In addition, plug in software support should be considered because many websites contain animations and videos now. Web designers should consider both browser considerations and platform considerations. Many web design books also mention this point.

Testing the website main searches reveals any problems about usability. By considering user's emotions, testing gives the opportunity to develop different directions or to add different considerations. Testing is an efficient method of searching usability problems. At this stage, the aims of testing are to search for design problems from these four directions.

'Much of web design is designing for the unknown: unknown users, unknown browsers, unknown platforms, unknown monitor sizes, and so on,' (Niederst, 2001: 37). It is vital to test websites on several browsers. The four main browsers are Internet Explorer, Netscape Navigator, Opera, and Safari. Each of these operates differently. Though they all understand HTML, they interpret it in different ways. As a result, website design elements may shift, fonts may get bigger or smaller, hyperlinks may loose their functions in different browsers, and other changes may appear depending on the browser used. It is definitely important to consider the final output module for designers. The existing technical design problem strongly influences the exploration of website. The better solution is to give greater attention to the browser your target market is most likely to use. In addition, it is important to avoid including features your target users' systems won't be able to make work. It is also necessary to test websites on the three main operating platforms accessible to users: Windows, Mac, and Linux. Viewing websites on different platforms is a crucial part of the testing process. Each of these platforms operates differently, and they do not all possess the same fonts or display information in the same way. Many dynamic websites currently appear on the Internet. This sort of website design poses more challenges for web designers than in the past. Animations, sound, Flash navigation, and many different types of loading files can play on the Internet or on PC, and these new design elements bring users new emotions and are also new challenges for designers. This new area still needs to be explored fully in order to obtain better design outcomes.



1. Interface design
2. Graphic design
3. Typography
4. Cognitive psychology
5. Information architecture
6. Information design
7. Animation
8. Interaction design

Background:

Web design is informed by a number of skills and disciplines, though it can not be understood entirely in their individual terms.

Figure 2.7 background of website design (from Macdonald, 2003)

Macdonald (2003: 21) presents background information about website design. This consists of eight main elements: interface design, graphic design, typography, cognitive psychology, information architecture, information design, animation, and interaction design. Each element and its relationship to the website design processes are shown in figure 2.7. As this chart show, cognitive psychology which concerns users' emotions has a relationship with interface design and interaction design. The design problem in terms of cognitive psychology may appear in graphic design, information architecture, information design, or animation.

In some areas, product design has a lot in common with website design. Like software, products tend to be task-orientated; through which they interface with the users in more dimensions in order to communicate what they can do and how they can be used. Moreover, website design also can extend the future development of product design to include emotional design. Website design, product design, and their development is more likely to inform a core business activity than print design and thus requires more extensive negotiation than perhaps engineering, sales, marketing, customer support

and many other different parts of the organization. Information architecture extensively informs website design particularly in the approach that flags the function of a building, the layout of information architecture and the relationships between these design elements that consist of three-dimensional spaces on the screen, orientation, direction-finding, and navigation, interaction with physical objects and the creation of workable environments. Accordingly, it may be necessary to consider that product design and website design also require knowledge of materials and a complex design process used to move design solutions from the idea to the reality.

Appropriately learning from other skills and disciplines might be useful in developing an understanding of website design and also in developing this discipline. Website development is a complex business requiring multidisciplinary input and, along with their particular solutions for their design problems, might help us to understand how the processes of these other disciplines have developed, and using these ways to collaborate with other elements, to drive creativity to reality. However, website design is not simply the sum of a number of skills. The significance of the Internet and this digital computing century are so great that, in the long term, web designers might have to go far beyond what they can learn from other disciplines to be able to realize the possible benefits.

'It should be pointed out that the net is not a panacea. There is an intrinsic weakness that the experts call 'presence invisibility,' (Guere, 2004: 8 and 9). This concept identifies the fact that, unlike traditional media, on the Internet it is the user who must find the information. The efficiency of websites intended to create or strengthen corporate identity depends on these being meeting places focused from the user's perspective, where information is offered systematically. This problem for website design is currently appearing in many areas of the Internet. Much evidence also appears in different research results. The concept is what is the idea that one wants others to think? Moreover, what should be the idea one wants others to think it should be.

Parker (1997: 60 to 70) stated in chapter 4 that learning by observing is one of the best ways for web designers to develop their website contents and design skills. The more sites designers visit, the more designers will appreciate the elements that go into a successful website, and the better designers will be able to identify problem areas when designers create or improve their websites. Just visiting websites is not enough, however. The key point to success is to carefully analyze the strengths and weaknesses of each of the websites and keep track of impressions and observations.

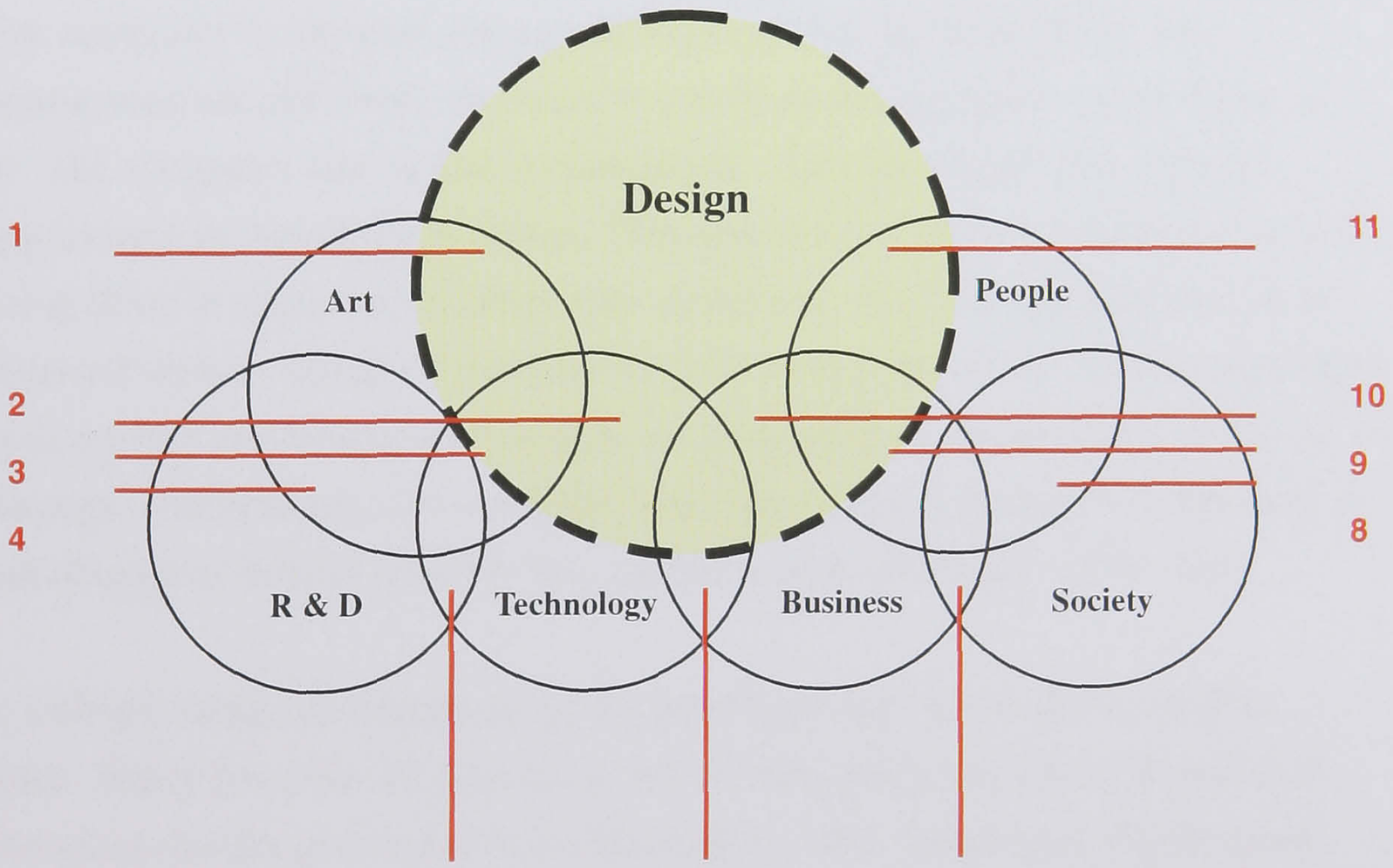
This is a good idea for web designers to train themselves and increase their observation abilities. The website impression sheet provides thirty questions for users to analyze this type of information, which are very helpful for web designers. These questions are listed below in table 2.8:

Table 2.8 the website impression sheet (from Parker, 1997)

The Web Site Impression Sheet	
01	Firm or organization posting the Web site?
02	Date visited
03	Contents of the opening Screen
04	Is scrolling required to access links?
05	Does the opening screen involve you or include a hook, i.e., something to capture your interest?
06	Opening page graphics
07	Does the opening page open, i.e., download, quickly?
08	Is the design of the opening page appropriate to the theme of the Web site or the business the firm is involved in?
09	Draw a thumbnail sketch of the opening screen
10	Does the design of the links reflect the site's theme?
11	Are the links intuitive?
12	Does the site contain frames?
13	Line length (articles and text features)
14	Are subheads used to break up long articles?
15	Do links at the beginning of articles permit you to go directly to subheadings within the article?
16	Is full contact information provided, i.e., telephone, mailing address, fax, e-mail?
17	Are forms used for visitor registration?
18	Are reasons given for visitors to register?
19	Quality of content
20	Does the site offer meaningful involvement, i.e., searchable databases, finance or lease calculators, custom-chosen views?
21	What design elements unify the web site?
22	Sketch a typical Web page at this site, indicating links and text placement
23	Links
24	Does the Web site contain valuable links to other Web sites?
25	Does the site make effective use of colour?

26	Does the Web site employ animation or movement?
27	Does the Web site contain sound?
28	Is the Web site useful and memorable?
29	Did you encounter any problems?
30	Overall rating of Web site

As mentioned before, a successful website not only depends on one or two expert's efforts. Group teamwork, the correct analysis of background information, and a suitable strategy around the target audience should be used in the design process. There is no certain rule or principle that can support or guarantee the development of a successful website but having many exceptions might ruin your initial idea. Reviewing figure 2.7 background of website design (from Macdonald, 2003), changed background information might cause a vibration for a chain reaction for the development of website design. To adopt usability to the design process or to set some basic rules for website design can help designers to create user-centered designed websites. These principles may come from different research fields.



1. What forms might possibilities take?
2. What solutions can be facilitated?
3. What its 'texture' and characteristics are?
4. What might be possible?
5. What is useful and can be productised?
6. What opportunities are enabled or problems soluble?
7. What is visible, acceptable and supported?
8. What social trends are current?
9. What forms can affect change?
10. What is commercially visible?
11. What is useful, usable and desirable?

Figure 2.9 design sites (from Macdonald, 2003)

Figure 2.9 shows the relationship and the core problems about design, art, people, R and D (Research and Development), technology, business, and society, (Macdonald 2003: 36). Although this basic figure shows the simple relationships between each other, it might supply a sort of clear direction for designers to think more than before.

Web design project workflows might be a useful method for website design. From pre-project to post launch, users can modify the content by changing surroundings and so understand it easily. This method contains nearly all the website design elements, which should be considered at present. To set a clear diagram also helps designers to communicate their design concepts or share ideas with their clients. A good process enables the designer to establish what the client really wants to achieve, and what users want to do and how.

2.2.3 Emotional design

> The computer is unusual among machines in that its shape, form, and appearance are not fixed: they can be anything the designer wishes them to be. The computer can be like a chameleon, changing shape and outward appearance to match the situation. The operations of the computer can be soft, being done in appearance rather than substance. Also the appearance can be reversed with a change of mind by the user. As users, we can create explorable systems that can be learned through experimentation, without fear of failure or damage. Furthermore, the computer can take on the appearance of the task; it can disappear behind a facade (its system image) (Norman, 1998: 183).

Dynamic website design development gives outcomes having the above similar performance. Many previous IC games can be created using flash now. In addition, varying interface design give users new experiences. This variation is challenging designers' abilities. Users' emotions maybe be influenced by these dynamic design elements.

Explorable Systems: Inviting Experimentation (Norman, 1998: 183 to 185)
One important method of making systems easier to learn and use is to make them explorable, to encourage the user to experiment and learn possibilities through active exploration.

1. In each state of the system, the user must be able to see and perform actions.
2. The effect of each action must be both visible and easy to interpret.
3. Actions should be without cost.

Above all, these basic guidelines are useful to control emotional design. Norman (1998: 16 and 190) introduced his mental model. This mental model consists of three aspects-the design model, the user's model, and the system image. This model is shown below.

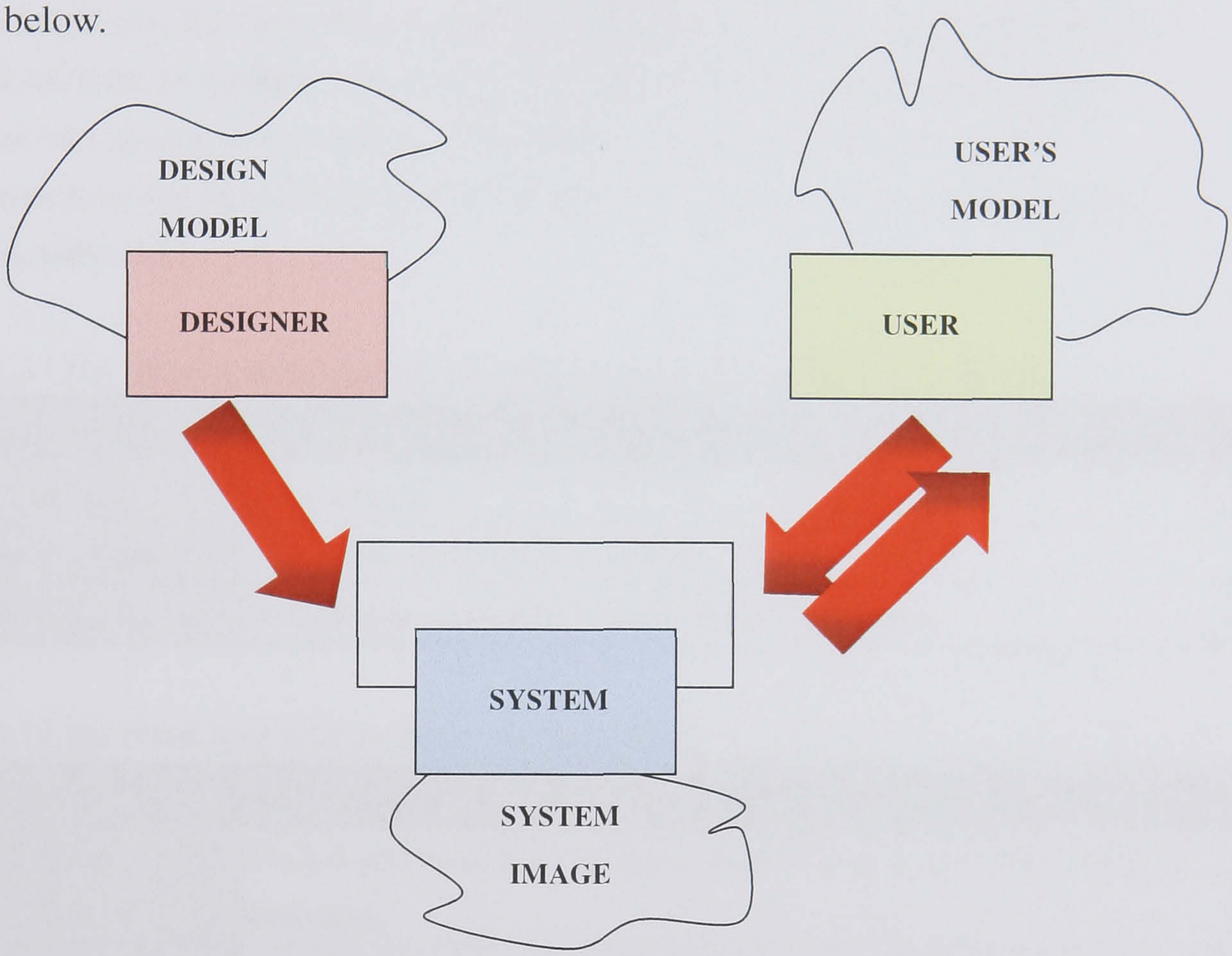


Figure 2.10 three aspects of mental models (from Norman, 1986)

Referring to figure 2.10, the designer might find it necessary to develop a conceptual model that is appropriate for the user, that also captures the important parts of the operation of the device and is understandable by the user. At website usability test, this method maybe can be used in the test process.

Three different aspects of mental models must be distinguished: the designer model, the user's model, and the system image. The design model is the conceptualization that the designer has in mind. The user's model is what the user develops to explain the operation of the system. Ideally, the user's model and the design model are equivalent. However, the user and designer communicate only through the system itself: its physical appearance, its

> operation, the way it responds, and the manuals and the instructions that accompany it (Norman, 1998: 190).

All three aspects of the mental model are very important. The user's model is essential for users to understand and it also depends on the initial stage that the designer starts with a design model that is functional, learnable, and usable. It is very important that the designer must ensure the system reveals the appropriate image system. Moreover, the user requires all knowledge of the system from that system image. This mental system might also be very important for website design. Using scientific methods – suitable systems or models – they can help the designer to develop their design outcome and approach the user's requirements. Norman (2004b: 38 and 39) introduces how the three levels can be mapped to product characteristics, shown below in table 2.11.

Table 2.11 the three levels of product characteristics (from Norman, 2004b)

The Three Levels of Product Characteristics	
Visceral design	Appearance
Behavioural design	The pleasure and effectiveness of use
Reflective design	Self-image, personal satisfaction, memories

Table 2.12 the three levels of website characteristics

The Three Levels of Website Characteristics	
Visceral design	Visual performance, dynamic performance, and the content of websites
Behavioural design	Navigation, interface, web control, loading time
Reflective design	Navigation, interface, memories (the short term memory)

These levels may help web designers to adopt them into website design. The three levels may be mapped to website characteristics in the above table 2.12.

Table 2.13 the seven stages of action for human beings (from Norman, 1986)

The Seven Stages of Action for Human Beings
Forming the goal
Forming the intention
Specifying an action
Executing the action
Perceiving the state of the world

Interpreting the state of the world
Evaluating the outcome

The above table 2.13 shows the seven stages of action for human beings that aims to analyze how people do things (Norman, 1998: 48). Before the Internet, human beings did not need to sit in front of a computer for long periods. This fact also influences human action and other areas of study at the same time. This might be called a sort of new influence due to increases in high speed. Although it might not be necessary to spend such a long period of time using the Internet, this change and its influence cannot be ignored anymore.

> The specific actions bridge the gap between what we would like to have done (our goals and intensions) and all possible physical actions. After we specify what actions to make, we must actually do them – the stage of execution. All in all, there are three stages that follow from the goal: intension, action sequence, and execution. The evaluation side of things, checking up on what happened, has three stages: first, perceiving what happened in the world; second, trying to make sense of it (interpreting it); and, finally, comparing what happened with what was wanted (Norman, 1998: 48).

The seven stages of action for human beings are: one for goals, three for execution, and three for evaluation. Norman also emphasizes that the seven stages form an approximate model, not a complete psychological theory. Actually, most human behaviour does not require following through all stages in sequence, and most activities will not be satisfied only with one or two actions. People usually use one activity to direct the further ones. In addition, the seven-stage process of action can be started at any point because people do not always behave as full, logical, reasoning organisms, starting with high-level goals or working to achieve them. Finally, the action cycle, stages of execution, stages of evaluation, and seven stages of action are shown below.

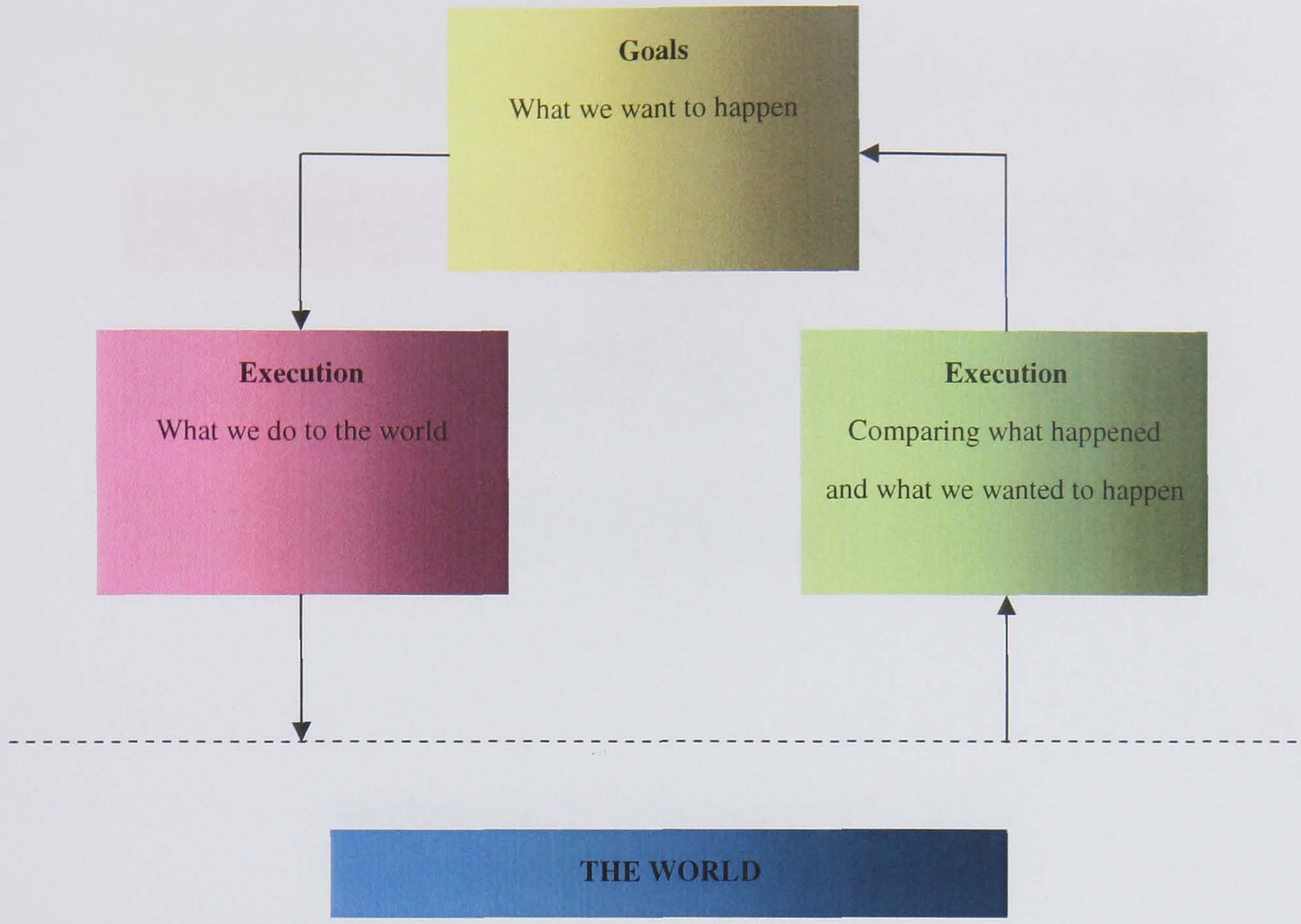


Figure 2.14 the action cycle (from Norman, 1986)

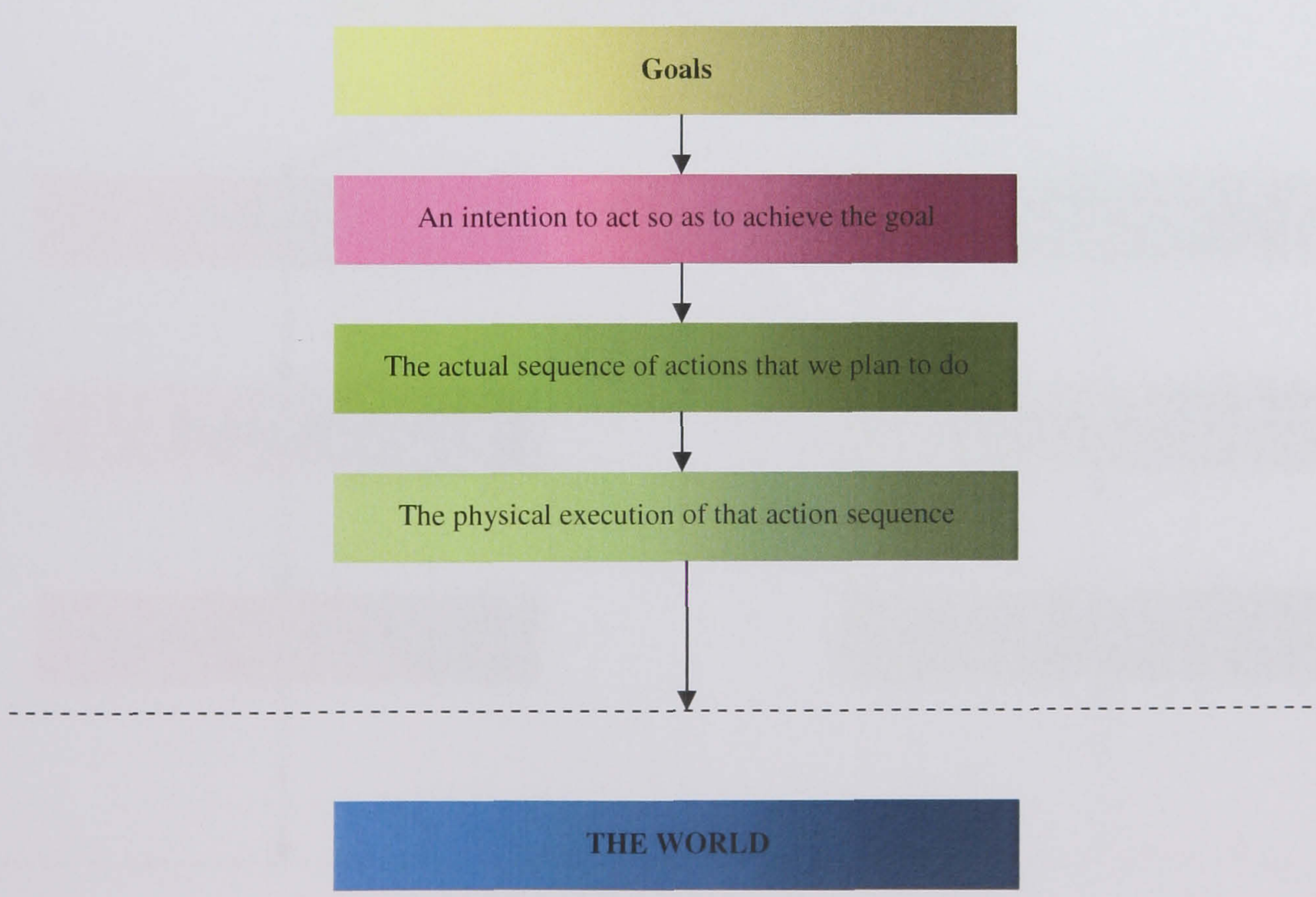


Figure 2.15 stages of execution (from Norman, 1986)

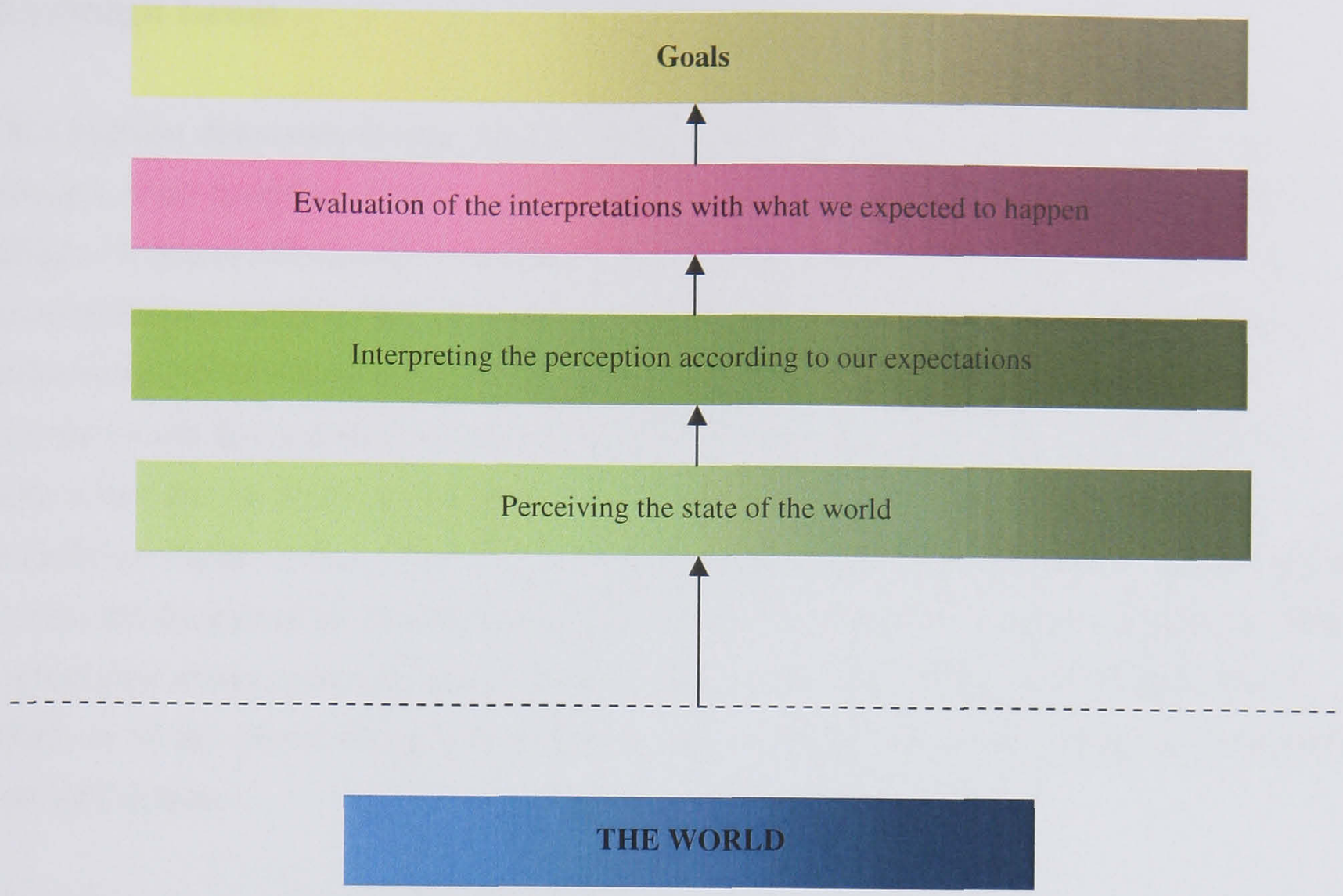


Figure 2.16 stages of evaluation (from Norman, 1986)

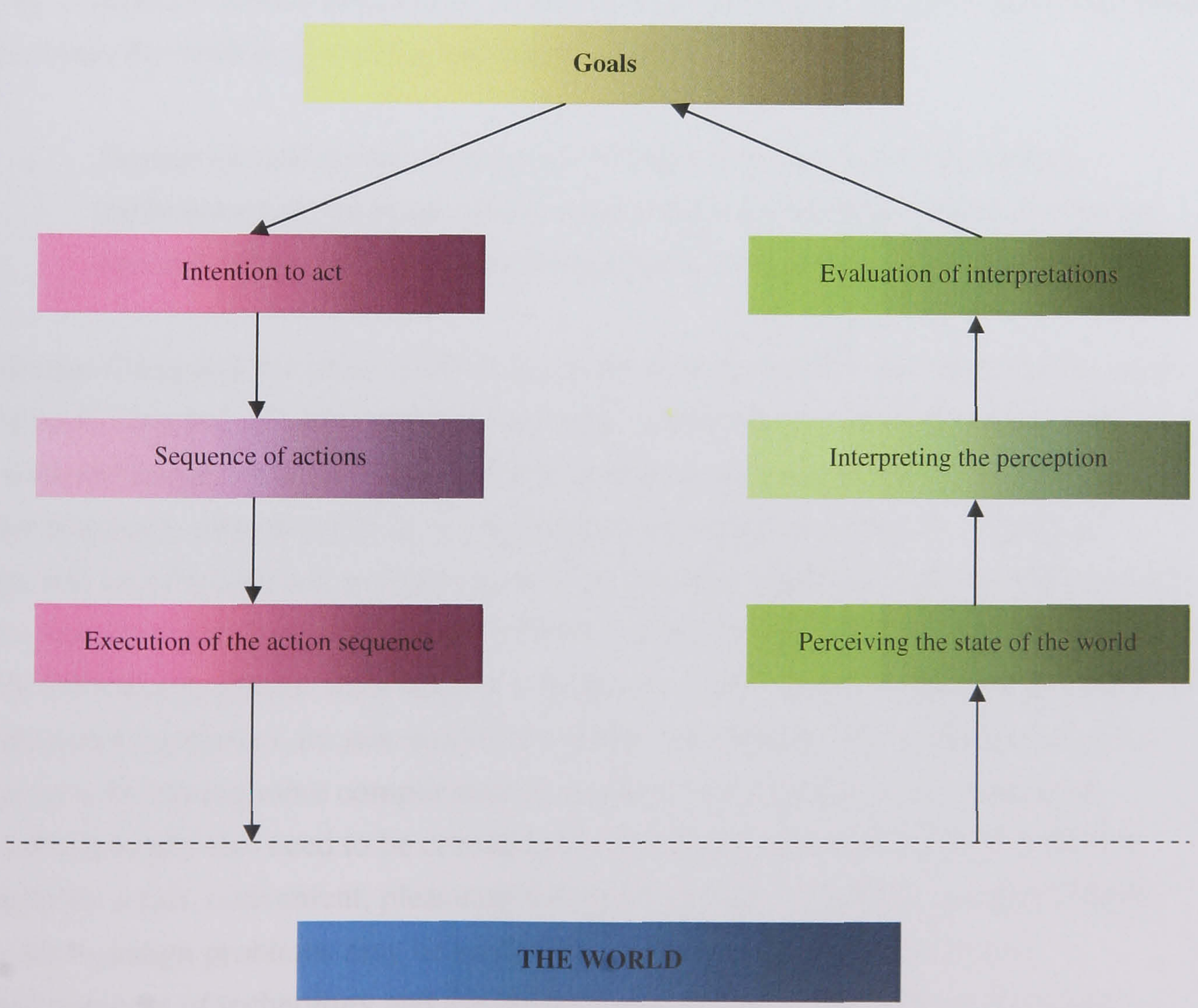


Figure 2.17 seven stages of action (from Norman, 1986)

2.3 Design Issues

This section discusses design issues. These are Human Computer Interaction (HCI) Design, User Interface Design (UID), User-Centered Design (UCD), and emotional design. It mainly discusses their definition, evaluation, implementation, and their relationships to each other. Through this method, their use in website design can be identified and developed in this research. In addition, to add some evaluation of visible examples and their developments might be essential to explain these fields with relevance to website design. It is important to discuss the development of traditional fields in this technological age and their challenge in order to ensure good future development in this area. In 'The Design of Everyday Things', Donald (1998) introduced many concepts and designs connected to User-Centered Design (UCD). With all of the above design concepts, the aim is to supply a convenient environment for individuals.

2.3.1 Human computer interaction (UID)

The Computer-Human Interaction Curriculum Development Group of the ACM (1992) provides the following working definition of HCI:

> Human computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them (ACM, 1992).

Human Computer Interaction (HCI) is a field of study that focuses on effective ways of improving the interaction between computer users and computer systems. HCI research has led to an abundance of information concerning the effective design, development, implementation, and evaluation of computer interfaces. The rapid growth of computer use in many facets of society has made the study of HCI essential to good interface design, including website design. Design plays a vital role in HCI. Basically, people share similar experiences when using computers and, while in one sense computers are now easier to use than ever before, the available functions are also becoming more complicated. In addition, the endurance for computing systems might also need to be considered in the development of HCI. HCI Design supplies a fast, convenient, pleasurable experience for individuals. As people know, today's design problems may be easily solved tomorrow, depending on the development of technology and the design team's efforts. Through analyzing the existing design outcomes and solving design problems, the core values of design can

better meet the needs of individuals.

Windows is the most popular system worldwide. Through its development from Windows 3.1 to Windows XP, it now combines various forms of entertainment into a single platform. The Mac system also offered a similar technical product. Microsoft has developed a media centre (software) that combines many essential functions into one platform in order to create human-interaction considerations in their products. Users can use this design outcome to connect easily to the individual functions. A similar design outcome also appears in the Sony Vaio Zone (figure 2.18 Sony Vaio Media Platform Table), the Vaio media platform (Figure 2.18 Sony Vaio Media Platform Table), the TOSHIBA media platform, mobile technology, and Apple products (i.e. iPod photo). Many advertisements for high tech products now emphasize pleasure rather than functionality. For example, Nokia stresses the fact that technology always comes through human nature. They use this idea to create a good communication website for their viewers, and supply another kind of pleasure to satisfy the users' desires. Viewers can skip the welcome page and go straight to the main page or use the spray pen to create something on screen. An example of this is shown in figure 2.19. The graphic designers at Toshiba use the animal Robots (Spring, Summer, Autumn 2004). By using emotional changes, viewers can easily perceive that this product can give pleasure to users. Although the narrow definition of HCI belongs to product design and computer products, some websites or graphic advertisements can be defined as being extensions of products, with which they share certain characteristics. In addition, Sony always uses entertainment equipment to describe their computer products. Using feedback from their general users, Sony has successfully employed this strategy to create satisfaction for the public about using their products. It is definitely possible to employ many promotions by using a correct business strategy, product design, and improved HCI design. Sony is the only Japanese company to use promotions during the last Asia economic crisis in Japan. If the function and value of products is considered, consumers tend to choose the cheapest one with multi functions; for example, there are many cheaper mp3 Walkmans than iPods now. Consumers are still satisfied with iPods because they create a higher level of emotion for consumers among similar products. This successful development experience suggests that designers should begin to consider Emotional Design. In addition, Nokia is also supplying other choices for consumers when choosing a new mobile – a multi-function mobile combined with a 4G hard disk that also can play music (summer 2005).

Advertisements may reflect the evaluation of HCI Design, the current situation, and

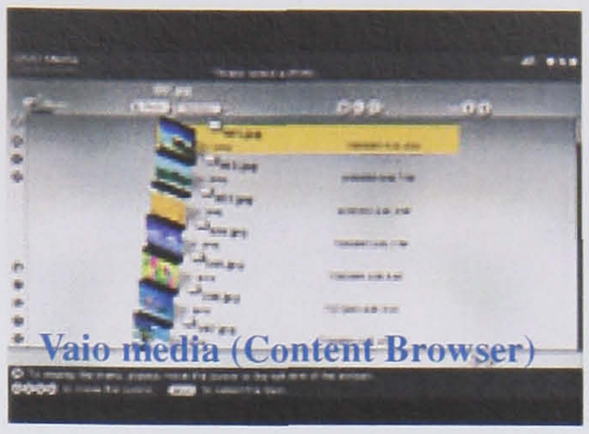
future strategies. There are many examples where different functions are combined in one product, with the intention of also creating pleasure. Moreover, Sony has successfully developed a media platform that can combine various forms of entertainment, as mentioned above. The interesting thing is that users can use different images from the folders for their screen background. This software can play images item by item, fixed or at a random, when playing music. In addition, this sort of technology is widely used in their other products, including mp3 Walkmans (VAIO pocket mp3 Walkman VGF-AP1) and PSP (a game machine). This design concept could be called a sort of emotional design. To compare Sony and Microsoft, the former can supply better visual effects, more interesting functions, and better graphic design than Microsoft. Also to compare Play Station 2 and X Box, a similar phenomenon appears. This may be one reason why Play Station 2 sells better than the X Box with good functions. In addition, WII (Nintendo's product) has emphasized its interactive design to users. This design has captured many users' attentions.

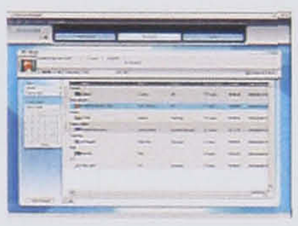
MSN is very popular with individuals currently because users can use this software to communicate with others efficiently by transferring texts, files, images, and emotional icons. Since MSN 4.0, designers have made emotional icons available for users to communicate with each other. Due to the evolution of this product, MSN 7.0 and MSN 7.5 can supply several emotive animated icons for users. An example is shown in Figure 2.19. The main reason for MSN developing emotional icons is linked to users' behaviour. Individuals need and like them. This is not the first development of emotional icons. The skype has the similar function on the Internet. At the first stage of computing development, many people were eager to use signs to convey their emotions (i.e. (o~o)) to others on BBS (an early computer platform working on DOS). People often wish to show their emotions to others rather than simply communicating via text. These emotional icons can create this effect for individuals, although emotional icons were very simple in BBS and in the early stage of development by MSN.

Many types of software and hardware have been developed during the same period, some of which are more successful than others. The popular term 'cool' is a very important element in the design outcome. 'Cool' means different, interesting, and humorous for users. These extensions of product value should be considered carefully during the design process.

Emotional design can be visible (using emotional icons at MSN), invisible (using images for the screen background, users can create different emotions when listening to music), or difficult to describe even when users can feel it. Emotional design can be

a core design element in HCI Design. The visual examples below are thought-provoking.




SonicStage (Music)

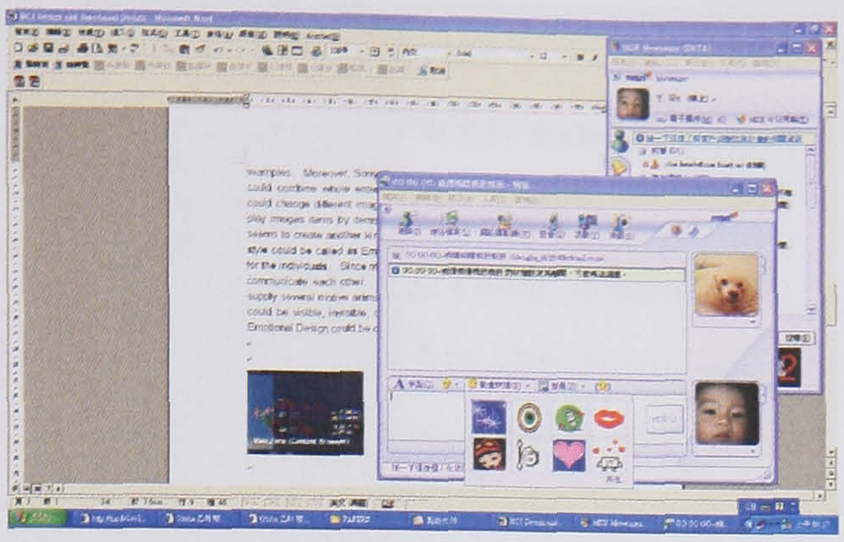

PictureGear Studio (Photos)


DVgate plus (Movies)


Click to DVD (DVD Creation)

Figure 2.18 Sony Vaio media platform table (an example of current HCI Design from Sony Company official website, 2004)

The Vaio zone combines Vaio media (entertainment software), SonicStage (music software), PictureGear (photo software), DVgate plus (movie software), and Click to DVD (DVD creation software). This design emphasizes the fact that consumers only require one finger to control all the various form of entertainment. 'One finger' means that it is easy to use and understand. This design can help users who are unfamiliar with using software. To develop this, HCI Design can utilize electronics. Thus consumer behaviour is considered well in the design process.



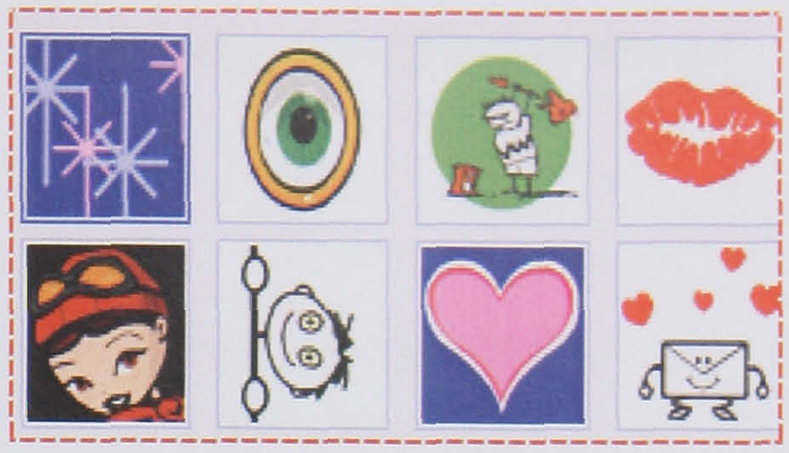


Figure 2.19 MSN 7.0 emotional icons and emotive animated icons

After MSN 7.0, MSN software supplies two different models of emotional icons i.e. graphics and animation. Users can also download their favourite emotional icons from websites or create them using other graphic software. Adding them in emotional icon blocks makes them efficient for users to use. To communicate their emotions via these small images or well chosen animations, MSN offers another kind of communication tool for individuals. This design outcome involves two different emotions; the use of emotional icons, and the particular emotion created by using them.

Preece (1993) defined HCI as being 'concerned with the design of computer systems that are safe, efficient, easy, and enjoyable to use as well as functional'. Preece also stated that HCI interaction consists of four components which are: of users, tasks, contexts, and computers. This is shown below in table 2.20 the components of HCI interaction.

Table 2.20 the components of HCI interaction (Preece, 1993)

The Components of HCI Interaction (Preece, 1993)	
Users	What do users expect and need? What physical abilities and limitations may users have? How do users' perceptual systems work? What social-cultural difference may users have? How may users' past experience and knowledge influence their usage? What may users find attractive and enjoyable when they use computers?
Tasks	Will the task be carried out regularly, infrequently or only

	once? What kinds of skills and knowledge are required to perform the task? Is time is critical? Are there are safety hazards? Are any special input and output devices required? Will the user do the task alone or with others? Will the user normally be switching between this and several other tasks?
Contexts (Environments)	Individual (end-user/ personal) systems-in support of work-related or leisure-orientated tasks. Organizational (work/ business/ commercial) systems-in support of organizational objectives.
Computers (User Interface)	Hardware elements: Input (keyboard, mouse, microphone…) devices and output (monitor, speakers, printer…) Software elements: Controls (menus, buttons, check boxes…), dialogue box, form filling, graphic interaction, command language, and natural language

Winograd (2003) divides HCI theories into three main areas for discussion. According to Winograd's definitions, HCI theories consist of Ontological-orienting theories, Structural-correctional theories, and Quantitative-empirical theories. All of them have a relevance to website design. According to his lecture (Where Do HCI Theory and Practice Meet?, Stanford University, 7.Feb.2003), Winograd pointed out four topics that have future value for website design. They are system response time, clutter, loss of control, and trust. Generally speaking, the fact that users lose control when viewing web pages (i.e. jumping to other advertisement windows, to confirm users' requirements) is definitely a very bad experience for everyone. Trust means the influence of using the Internet. Different search engines and websites have different target audiences. Comparing their advantages and disadvantages, designers should adopt strategies to meet users' requirements. On the one hand, Winograd (2003) supplied a concept about user's requirements. This concept is shown below.

1. Don't make me think.
2. Don't make me wait.
3. Don't make me annoyed.

4. Don't take control away from me.
5. Don't take advantage of me (Don't be evil.). (Winograd, 2003)

Thinking, waiting, feeling annoyed, taking control away from users, and taking advantages of users all belong to the area of user's emotion. What people like and dislike might be the core problem to approach the design consideration at the pre-design and design stage. It is important to acknowledge that doing a good service and adopting current information for users belongs to the post-design stage but these factors should be better considered in the design process.

On the other hand, Winograd (2003) also supplied four topics about the future development or challenges for HCI theories, as shown below.

1. Contextual vs. isolated effects
2. Metrics beyond efficiency and productivity
3. Situational effects of physical embodiment
4. Long time scale of effects (Winograd, 2003)

In fact, Winograd does not supply any solution to solve these design problems. He suggests that these problems should be in the future development or direction for website design and that they really need to be considered well. In on line information - http://hci.stanford.edu/bds/ - Winograd (1996) also emphasizes the importance of design for the development of HCI. In 'Bring Design to Software' Winograd shows how to improve the practice of software design, by applying lessons from other areas of design to the creation of software. The goal is to create software that works---really works---in being appropriate and effective for people who live in the world that the software creates. This book contains essays contributed by prominent software and design professionals, interviews with experts and profiles of successful projects and products. These elements are woven together to illuminate what design is, to identify the common core of practices in every design field, and to show how software builders can apply these common practices to produce software that is more effective, more appropriate, and more satisfying for users. HCI Design likes other areas of design needs correct evaluations and experienced designers.

2.3.2 User interface design (UID)

'Interface design encompasses three distinct, but related constructs--usability, visualization, and functionality' (Vertelney, Arent, and Lieberman, 1990). Recently, a

fourth component of interface design has emerged as a critical factor-accessibility. Accessibility is also emphasized in website design now. Interface design is most often associated with the development of web pages, computer software, and multimedia, but is relevant to the creation of any instructional media or technical equipment. Each topic is discussed below.

1. Usability:

User Interface Design refers to how intuitively or easily your media item is navigated and processed (flow, sequence, instructions, loading time). This sort of construct is the most inclusive of the three and is influenced by both visualization and functionality.

2. Visualization:

User Interface Design is creating visually interesting and aesthetically pleasing media items while avoiding potentially distracting or unnecessary elements.

3. Functionality:

User Interface Design refers to the features of design media item and how useful they are in supporting a given task (e.g., interactive simulations, drill and practice quizzes, site maps, frequently asked questions, search engines). Through the development of technology, this area should be increased.

4. Accessibility:

User Interface Design is an emerging web interface design topic; if not addressed, it will negatively influence website usability for users with certain disabilities; tools that help users access your site in alternative formats (e.g., text, aural, visual) provide for increased functionality. This area belongs to the range of emotional design--what people like or dislike (Vertelney, Arent, and Lieberman, 1990).

User Interface Design has a great relevance to enhancing website usability and creating positive emotions for users. In addition, this key point also influences user's demand which is the second influential element that ensures that users will come back to the website. Users are accustomed to current website interface design already but this does not mean that current methods about interface design are the optimum for users. At present, welcome pages are often designed with animations but this design has no advantages to enhance website usability. In addition, if this sort of design appears in the menu page, software support and loading time can be adversely affected.

Suctliffe (1995: 98-132) identified six styles of user interaction: simple control dialogues, form-filling, menus, direct manipulation, command languages, and natural dialogue. It is generally agreed that the interface should be easy to use in that, through simplicity and consistency, access by the user is made as intuitive as possible.

The intuitive emotion consideration should be constructed in the navigation and information architecture. Common life experience considerations may be considered in the design process, especially when designing some existing objects that are widely used for many people over a long period of time. To continuously solve interface design problems depends on increasing the communication opportunities with users. In addition, designers should avoid designing something with no meaning.

Let us consider User Interface Design in a broad context. In this approach, User Interface Design comprises the overall definition of how the user interacts with the product from a physical and software perspective. Therefore, User Interface Design includes the definition of interaction procedures, the visual representation (such as Graphical User Interfaces, or GUIs), and the physical representation of the product (the Industrial Design). It is definitive that the mandate of designing products exceeds expectations in terms of obvious customer value, and total ease of use can best be achieved when adopting an integrated approach towards design.

The purpose of User Interface Design is to define the hardware and software operational features of the proposed product in sufficient detail to verify the product's future usability, and to provide the development team with the information to effectively build the product. The underlying information deploys the following approaches to reach these goals:

1. High Level User Interface Design: to define the high level physical and software operational features of the product, including the definition of metaphors, architectures, and multi-sensory interaction modes such as speech, natural language, animation and sound. The resulting proposal will be evaluated against targets of obvious customer value, total ease of use, and design, manufacturing and cost restrictions. But web users belong to an invisible group, so to enhance the communication opportunities or to improve the current methods may be a better approach to high level user interface design for website design.

2. Detailed User Interface Design: to further develop, define and document (using media such as video, operational prototypes, and documents) the high level user interface design.
3. Prototype Development: to aid the development of the high level and detailed User Interface Design (low fidelity prototyping), to verify the product's usability and marketability (high fidelity prototyping), and to document proposed solutions (Suctliffe, 1995: 98-132).

Vertelney, Michael, and Lieberman (1990) introduced two disciplines in search of Interface Reflections for a design problem. Computer programmers and graphic designers appear to operate in distinctly different worlds but they need each other to approach visual products for users. A similar problem also appears in website design.

> Yet as computer systems become more graphic and communications media more interactive, experts in the two disciplines find themselves increasingly called upon to deal with the same subject: the design of interactive graphical software. Can this shotgun marriage be made to work? (Vertelney, Arent, and Lieberman, 1990)

Their literature provides the actual analysis and decision-making processes used by programmers and graphic designers in the development of interactive applications. Their opinions are beneficial in terms of how designers and programmers should consider co-operation. Vertelney, Arent, and Lieberman (1990) supplied two problems shown below.

1. The Map Problem: A Benchmark for User Interface Design
2. A Comparison of Design Approaches: What were the areas of the interface analyzed by the two interface designers, what were the perceived problems, and what paths did they follow in terms of resolving design problems? The problems and their solutions can be mapped onto three primary criteria in interface design:
   - Usability: Can users easily learn and efficiently interact with the Map to get to the desired information?
   - Functionality: What functions and controls are available to allow optimal use of the Map database?
   - Visual communication and aesthetics: How do the visual appearance and spatial location of the elements of the Map optimize functionality? (Vertelney, Arent, and Lieberman, 1990)

Through their discussion, Vertelney, Arent, and Lieberman (1990) made a conclusion about this topic and supplied some suggestions for designers to develop their tasks. Generally speaking, there are two viewpoints. These are where does the 'user's viewpoint' come from and when is it right to change the rule. The first suggestion can be discussed from three design perspectives. Their opinions are shown below.

Where does the 'user's viewpoint' come from?:

1. Interface designers can consider themselves as potential users.
2. Interface designers can simulate potential users.
3. But neither of these alternatives is as reliable as actually asking real users!

When is it right to change the rule?

Interface guidelines, such as those formulated for the Macintosh, may constrain the exercise of creativity, but they can also be of great value to the designer. They both express and help to set user expectations through consistency, allowing the designer more reliably to predict user behavior. They also remove at least some of the burden of making trade-off decisions from the individual designer's shoulders. Even when a designer decides to 'break the rules', it is worth analyzing the rule being broken to discover its original purpose and to predict the effects of violating it (Vertelney, Arent, and Lieberman, 1990).

Many systems, concepts, and models can help designers to develop their design project but this does not guarantee one hundred percent success. The designer's experience plays a vital role in this area to justify making a decision. Personal experience and insistence will be either a positive power or negative power. It is difficult to find one fact to fit any situation in design. The disciplines of interface reflections in website design can be discussed in many different areas. The functionalities of websites may be the limitations for web designers to develop wider interface design than graphic designers. The right click of the mouse for a Mac may cause many PC users to be unfamiliar with Macs. This example shows that web designers may be better to follow pop website interfaces in order to maintain the readability and usability for website interfaces. But if adopting a long term view, to develop new interface design for website design makes it possible to enhance the website usability, as in other design areas. Different web devices might be better to be

considered in the design process.

Reeves and Harmon (1993) supplied a method-User Interface Rating Form and Evaluation Matrix to calculate user's interests about Interface Design and Interactive Multimedia. This sort of method is very useful for designers to account for 'user's first impressions' when considering their design tasks.

Although by all appearances, the Evaluation Matrix and User Interface Rating Form are simple tools, they have a powerful purpose, supplying a useful method for designers to consider a wider range of data collection methods than might otherwise be considered in relation to each of the questions addressed by the evaluation.

> Evaluators sometimes get into the habit of using one or other data collection method, e.g., an end-of-training questionnaire, without considering the advantages of alternative methods (Reeves and Harmon, 1993).

This tool prompts the designers to consider each evaluation question and to decide which of the many data collection options have the greatest potential for providing the desired information. Generally speaking, this research supplies an appropriate method for designers to incorporate emotional design in their design tasks.

2.3.3 User centered design (UCD)

Interface System International Inc. supplies a definition about User Centered Design as being the basis for the User Interface Design Process. Well-designed user interfaces are centred on the user and their tasks. The design process is made up of two design phases:

Phase One: Information Gathering and analysis
Phase Two: User Interaction Design and Interface object definition

> The point of POET is to advocate a user-centred design, a philosophy based on the needs and interests of the user, with an emphasis on making products usable and understandable (Norman, 1989: 188). In graphical design, one is really talking about conventions, or what I called logical and cultural "constraints" in POET.

Through this concept, Norman (1989: 188-189) supplied some suggestions in this area

shown below.

Design should:

1. Make it easy to determine what actions are possible at any moment (make use of constraints).
2. Make things visible, including the conceptual model of the system, the alternative actions, and the result of actions.
3. Make it easy to evaluate the current state of the system.
4. Follow natural mappings between intentions and the required actions; and between the information that is visible and the interpretation of the system state.

User-Centered Design should approach two points:

1. The user can figure out what to do.
2. The user can tell what is going on (Norman, 1989: 188-189).

The discussion of User-Centered Design in website design can be based on visual performance considerations, dynamic website considerations, and navigation considerations. All considerations have a relevance to users' actions. As the number of users of the Internet has increased greatly and quickly, many companies or organizations build their websites to extend their profit and services. Although web tools and techniques are continuously proposed, there still remain some serious problems related to website design, such as the usability of websites, absence of structured design methods for websites, and the maintenance of great websites.

User-Centered Design (UCD) can be called a sort of philosophy and process. It is a philosophy that the user is placed at the centre; it is a process that focuses on cognitive factors (such as perception, memory, learning, design problem solving...), such as come into play among users' interactions with visible things.

User-Centered Design mainly seeks to answer questions about users and their tasks and goals, and then use the findings in order to drive the development of design.

User-Centered Design mainly seeks to answer these questions, which are shown below.

1. Who are the users of this thing?
2. What are the users' tasks and goals?
3. What are the users' experience levels with this thing, and things like it?
4. What functions do the users need from this thing?
5. What information might the users need, and in what kinds of form do they need it?
6. How do the users think this thing should work?
7. How can the design of these things facilitate users' cognitive processes?

Katz-Haas (1998) introduced 'Ten Guidelines for User-Centered Web Design' in Usability Interface, Vol 5, No. 1, July 1998. Most users do not really read web pages. Instead, users might scan text for specific pieces of information in the process called information retrieval. By adopting User-Centered Design (UCD), designers can improve the usefulness and usability of websites by considering information retrieval and other factors. These guidelines are shown below.

In a paper discussing UCD and website development, Katz-Haas (1998) supplied the following ten topics for website design, as shown below.

1. Visibility
2. Memory Load
3. Feedback
4. Accessibility
5. Orientation/Navigation
6. Errors
7. Satisfaction: Make your site pleasant to use and view. Users' satisfaction with the interface influences their perception of ease-of-use, motivation for learning how to use the site, and confidence in the reliability of the information in the site.
8. Legibility
9. Language
10. Visual Design (Katz-Haas, 1998).

Generally speaking, Katz-Haas's method about website design solutions supplies an appropriate way to solve Winograd's suggestion about users' requirements. The users' demands are only limited to adopting user testing to solve all website design problems that seems not to contain a post published stage. To maintain websites and upgrade their contents are often key points in developing a new concept in web service for users. Designers or their clients often ignore this stage but it is important to search for

these invisible users' opinions. At the redesign stage or the maintained stage, web designers should give clear descriptions about expired time for users and put as much necessary information on web pages as they can. The websites in this area are not similar to the products. The real products often have their company support and their service systems to support their consumers. Web designers should reconsider this ignored stage.

> Results of usability testing showed that the success rate was eighty percent when people used the navigation scheme structured according to most user's mental model and only nine percent when using the navigation scheme structured according to the company's internal thinking (Nielsen, 2000a: 202).

Nielsen (2000a: 380 and 382) supplied a 'HOME RUN' concept for constructing UCD website design. This concept is shown below.

Home:

High-quality content
Often updated
Minimal download time
Ease of use (Nielsen, 2000a, 380)

Run:

Relevant to user' needs
Unique to the online medium
Net-centric corporate culture (Nielsen, 2000a, 382)

Travis's (2000) survey about web usability produced the same result. The order of his investigation is high-quality of content, interface design, loading time, and updating of the information.

In web design, it's all about the user. Terms like user experience and user-centric design are used frequently and taken seriously. Formal studies abound, but in essence, it's about getting into the heads of your users in order to create a design that meets their needs and expectations (Niederst, 2001: 313).

Katz-Haas (1998) also introduced seven directions to develop user-centered web sites. These principles are shown below.

1. Involve users from the beginning
2. Know your users
3. Analyze user tasks and goals
4. Don't settle on a final direction too soon
5. Test for usability—repeatedly!
6. Learn More
7. Other Suggestions: Read the research in these fields. Attend conferences and seminars. Consult with specialists. Join professional organizations. Observe people's behaviour towards 'things' (Katz-Haas, 1998).

Basically, User-Centered Design has developed well in many different design areas, especial product design. As people know, some sorts of websites can be considered as another extended product but may not always be the same one. This point also needs to be considered well in website design. User-Centered Design cuts costs and also increases user satisfaction and productivity. Design for usability and test for usability are an iterative process, which is essential for testing throughout the development cycle. Nielsen (1995) lists the ten most grievous offences against users. Web design disasters and HTML horrors are legion, though many usability atrocities are now less common than. These mistakes are shown below.

1. Bad Search
2. PDF Files for Online Reading
3. Not Changing the Colour of Visited Links
4. Non-Scannable Text
5. Fixed Font Size
6. Page Titles with Low Search Engine Visibility
7. Anything That Looks Like an Advertisement
8. Violating Design Conventions
9. Opening New Browser Windows
10. Not Answering Users' Questions (Nielsen, 1995)

Above all, these mistakes might adversely affect the users' emotion when viewing this sort of website. But point nine still needs to be discussed, since some loading files would do better to adopt opening new browser windows for web users. If users need

to download a great number of images, this sort of design will help them to decrease the loading times. To reduce users' annoyance is very important in reducing the spent navigation times. If one click can achieve the aim, web designers should use less motion times to achieve the same aim. In addition, jumping browser windows, too slow loading time, and pop-up advertisements covering normal web information cause users' to experience negative emotions when using websites.

2.3.4 Emotional design-beyond usability

Norman did not give a clear definition of emotional design. The only definition that he provides is Conceptual Models.

> The design model is the designer's conceptual model. The user's model is the mental model developed through interaction with the system. The system image results from the physical structure that has been built (including documentation, instructions, and labels). The designer expects the user's model to be identical to the design model. But the designer doesn't talk directly with the user all communication takes place through the system image. If the system image does not make the design model clear and consistent, then the user will end up with the wrong mental model (Norman, 1998: 16).

In the book 'Emotional Design', Norman (2004b: 3) gives an example of three different teapots in order to present the concept of emotional design, which is necessary in all design. In addition to usability, aesthetics, and practicality, emotionality should also be considered in the design process.

In ancient times, many different people decorated special patterns on shields in order to scare their enemies on the battlefield. Much evidence can be found on antiques. This development continued up to World War II. Many aircraft were decorated with special emblems or patterns with a similar aim. This also involves two different sets of emotions; one for the users and the other for the viewers. The aim is to create confidence in the users, and a sense of horror in the viewers, in order to achieve success. These symbols are not used in modern warfare, however; visible war has been replaced by invisible wars, and this type of design is no longer employed in modern times.

Emotional design should be considered well in order to define it more specifically, while remaining in accordance with Norman's definition. Emotional design has

existed in human culture for a long time. When comparing western culture and eastern culture, the phenomenon appears to have been fairly similar. In terms of decorated shields and aircrafts, these designs contain some elements of emotional design, but there is no element of pleasure in these products. This design rationale continues to scare enemies and to create confidence on the battlefield, and so belongs to the physical level.

Different cultures and times will influence the value of design. Some design outcomes can lose their position or value but the core design can be developed into another style.

Norman (2004b: 17) introduces that attractive things work better: in the early 1990s, Japanese scientists Masaaki Kurosu and Kaori Kashimura (1990) conducted research into ATM machines. This research used various groups with the same functions and icons but with different interface designs and layouts. The results of this research suggest that aesthetics plays a key role in the design outcome. Aesthetics can help to develop the utility of a product. A positive emotion can help users to abandon traditional logical thinking, and make it easy for individuals to understand and use the product.

During the early development of Microsoft software, the Windows system failed to supply a reliable and enduring platform for consumers. Although their business strategy developed the first stage of their business, they still needed to develop a better platform for consumers to secure their market position. Windows XP and Vista are very different to their previous products. They contain a high degree of HCI design and User-Centered Design in the software. By using different classifications for this software, users can easily understand and use it. They also considered their more traditional users, and so retained a traditional browser on this platform. They aimed to supply different choices to the consumers. Emotional design should be considered in different ways in the design process. Norman (1998) also discussed the concepts about HCI Design, Product Design, Interface Design, and User-Centered Design in The Design of Everyday Things. Dynamic website development has a great relevance to combining emotional design and website design. Through adding animations, sound, and Flash navigation into website design, these varieties of new design web elements can create unexpected effects for users.

2.4 The behaviour of web users

In the light of more than four hundred million users who now frequently use the Internet, it is hardly conceivable that just only twenty years ago, the number of computers attached to the net was only one thousand items in 1969. No one could predict that in the 1990s this particular product--the Internet--would develop into the field for artists, graphic designers, musicians, creative types in other areas, and even more its huge influence on individuals. Through its development, access to or the exchange of information is no longer limited by time or place. Internet access, especially for WWW based services is becoming a popular application for human beings. In addition, many users enjoy on line games now. This sort of influence about web users' behaviour should directly influence web designers' projects and their future development. The behaviour of web users is very important for web designers, which means that designers need to understand their preferences and after how long users will loose interest in their websites. The life of a website might be shorter than the life of a product or the same period of time (it means that the client can change or renew their websites).

'What do people like and dislike on the Internet?' and 'Why do people like and dislike certain things on the Internet?' These are the basic design questions-'what' and 'why'. These basic design questions were introduced in DESIGN CAPABILITY and AWARENESS by Morrison and Twyford (1993). Web designers also do not contact users directly, so how they can figure out users' desires and avoid making mistakes on their websites? Through understanding of the evaluation of marketing, testing, and feedback from the target audience, designers can understand the current situation in time and adopt the necessary strategy for their websites. By adopting Maslow's Hierarchy of Needs, Hierarchy of Needs, 80/20 Rule, and the product Life Cycle, the aim is to identify the behaviour of web users and to supply solutions for improving the current web design problems.

Two basic concepts are necessary for web designers to develop their web projects. The first one is to make a suitable judgment in order to design what people like and avoid designing what people dislike. Secondly, it is essential to make a suitable judgment for the optimum time to modify the web element or renew websites. Both of these are very necessary for web designers to develop a better web project in order to meet the requirements of the client and the service for web users. The first concept belongs to the pre-project and the design process. The second one belongs to the stage of post-project. Lidwell, Holden, and Butler (2003: 106 and 107) introduced the 'Hierarchy of Needs'. In order for a design to be successful, the design outcome must meet users' basic needs before it can attempt to satisfy higher-level needs. Hierarchy

of Needs and Maslow's Hierarchy of Needs are shown below in figure 2.21 and figure 2.22.

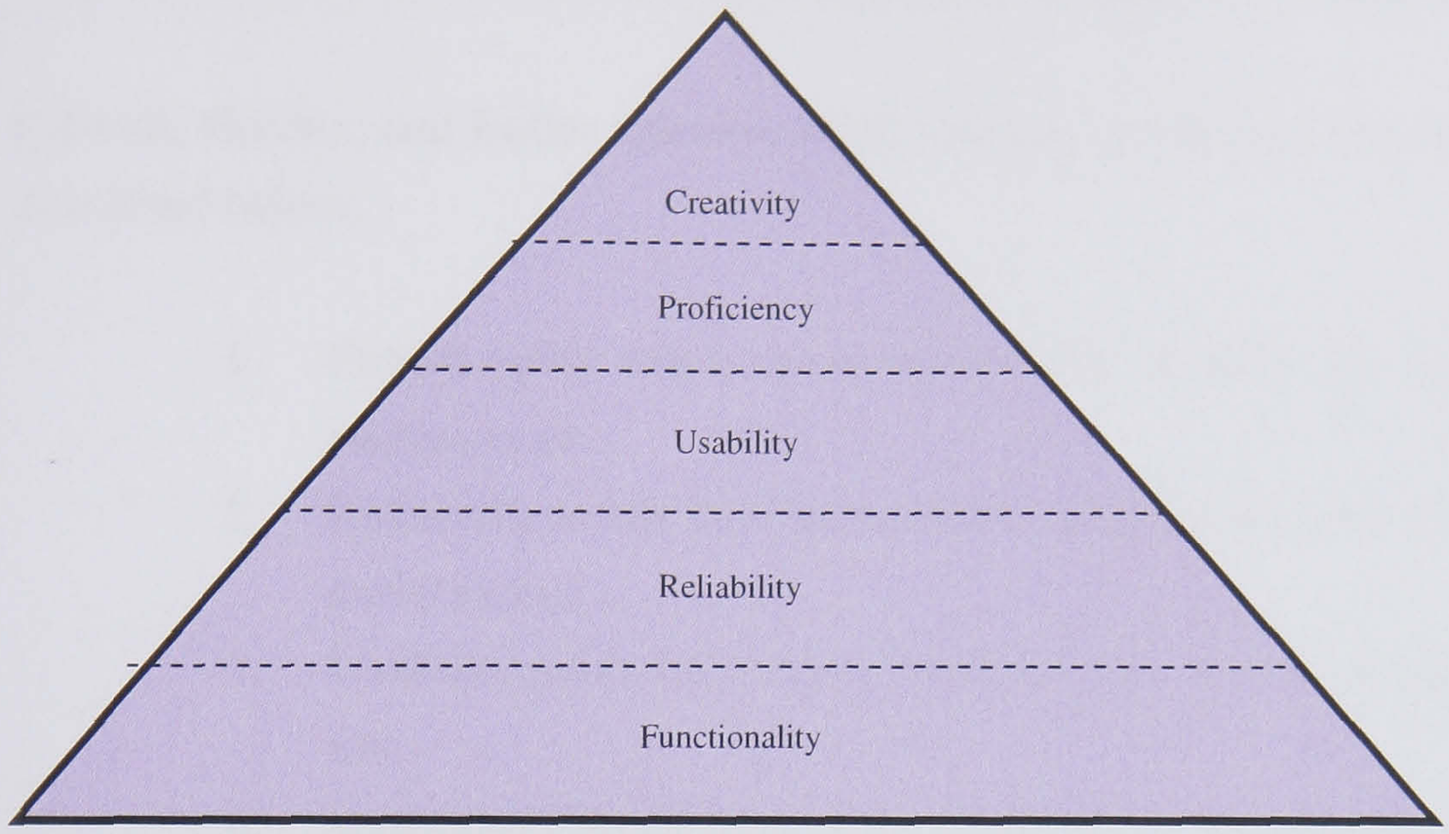


Figure 2.21 Hierarchy of Needs (Maslow and Wesley, 1987)

The seminal work on the concept of a hierarchy of needs is Motivation and Personality by Abraham Maslow and Addison Wesley (1987).

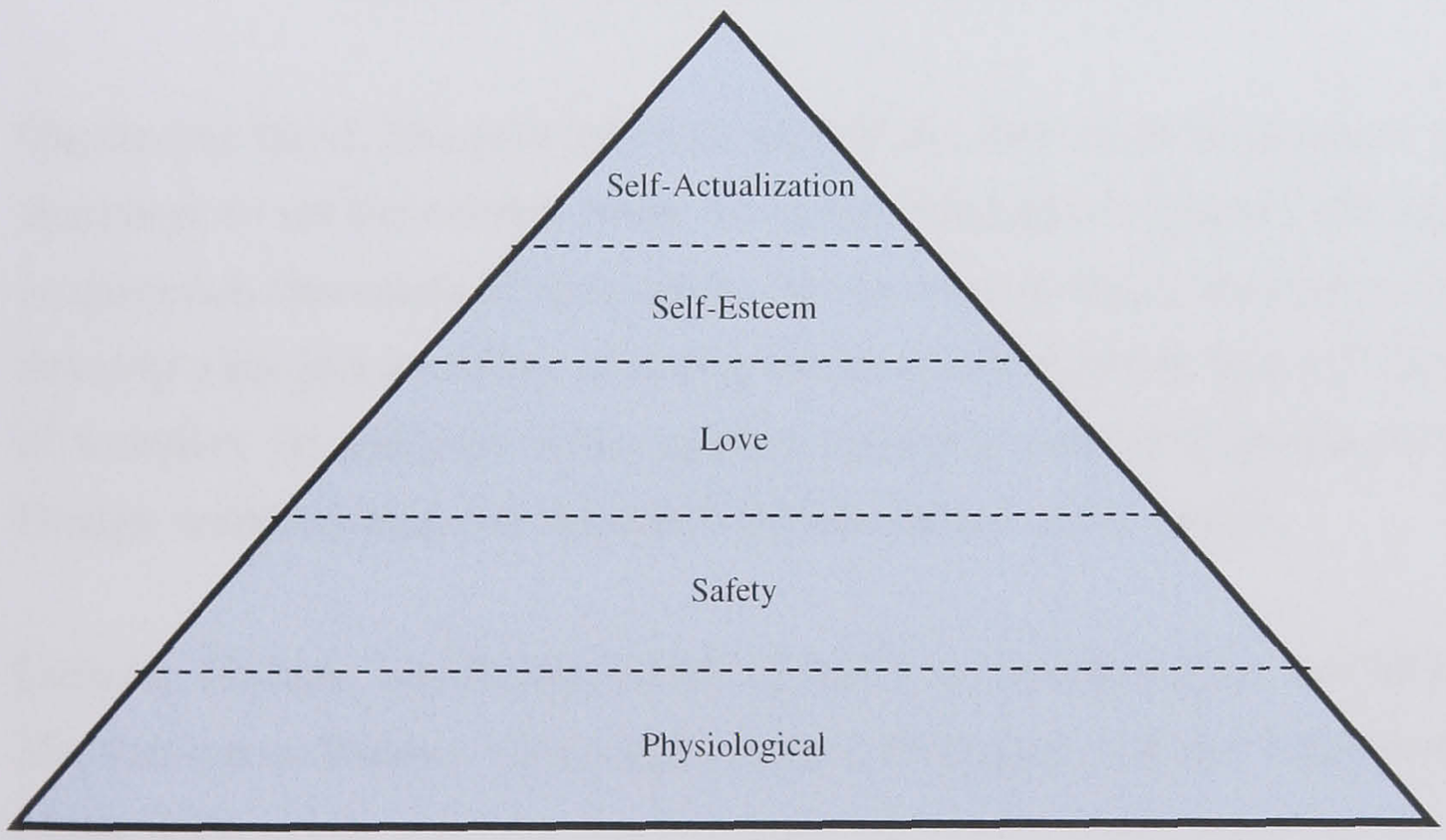


Figure 2.22 Maslow's Hierarchy of Needs (Maslow, 1954)

The hierarchy of needs specifies that a design must address lower-level needs before high-level needs can be addressed. The perceived value of a design corresponds to its place in the hierarchy-i.e., higher levels in the hierarchy correspond to higher levels of perceived value. The levels of hierarchy are adapted from Maslow's Hierarchy of Needs (1954).

> Good designs follow the hierarchy of needs principle, whereas poor designs may attempt to meet needs from the various levels without building on the lower levels of the hierarchy first (Lidwell, Holden, and Butler, 2003: 106).

Lidwell, Holden, and Butler introduced the five key levels of needs in the hierarchy described below.

1. Functionality needs have to do with meeting the most basic design requirements.
2. Reliability needs have to do with establishing stable and consistant performance.
3. Usability needs have to do with how easy and forgiving a design is to use.
4. Proficiency needs have to do with empowering people to do things better than they could previously. Designs at this level are perceived to be of high value.
5. Creativity is the level in the hierarchy where all needs have been satisfied, and people begin interacting with the design in innovative ways (Lidwell, Holden, and Butler, 2003: 106).

On the one hand, this principle can supply the correct understanding for web designers to set the correct order of design elements to develop the web plan in order to approach the needs of web users. On the other hand, it also helps designers to develop a project avoiding adopting needs considerations that will reduce the quality of websites. In addition, it also applies a correct method to develop Users-Centred Design websites that can approach the client and users' needs.

Lidwell, Holden, and Butler (2003:12 and 13) introduced the '80/20 Rule', which is also known as Paresto's Principle, Juran's Principle, and the Vital Few and Trivial Many Rule.

> The first recognition of the 80/20 rule is attributed to Vilfredo Pareto, an Italian economist who observed that twenty percent of the wealth was strongly influenced by eighty percent. The seminal work on the 80/20 rule is the Quality Control Handbook by Joseph M. Juran (1951), McGraw-Hill, 1951 (Lidwell, Holden, and Butler, 2003: 12).

Table 2.23 80/20 Rule (Juran, 1951)

80/20 Rule	
80 Percent	20 Percent
Product Usage	The Future of The Product
Traffic	Roads
Company's Revenue	Company's Products
Innovation	People
Progress	Effort
Errors	Components

The 80/20 rule means that a high percentage of effects in any large system that are caused by a low percentage of variables. This rule asserts that approximately eighty percent of the effects generated by any large system are caused by twenty percent of the variables in that system.

> All elements in design are not created equal. Use the 80/20 rule to access the value of elements, target areas for redesign and optimization, and focus resources efficiently (Lidwell, Holden, and Butler, 2003:12).

In fact, website design contains many more different design elements than graphic design or other design fields. The 80/20 rule is observed in many large systems, including economics, management, user interface design, quality control, and engineering. The 80/20 rule has since evolved into a proven principle that works in just about any field - website design in no different. With respect to website design, users can say that twenty percent of the work will take up eighty percent of their time.

It is worthwhile to identify that expensive twenty percentage and do something about it to help designers to identify many web design elements for their users. What is that twenty percentage of the work (in a typical website design project) that is taking eighty percentage of the users' time? An idea might be to investigate two fields to solve this design problem about web users' behaviour.

1. Figuring out what the users want and dealing with it.
2. Creating the basic structure for the website.

In fact, some websites can be considered as huge systems. This rule should also be suitable to control the quality of websites, to discuss the relationships among design factors, to set all essential functions for web users, and to manage the structure of

websites. In addition, this rule can be one strategy for analysing the behaviour of web users in order to search for solutions for designers.

The seminal work on the product life cycle is International Investment and International Trade in the Product Cycle by Raymond Vernon (1966), Quarterly Journal of Economics, 1966. Websites sometimes can be similar to other sorts of real product, so that the life cycle might be also helpful for web designers to make a correct judgment to renew web data over time or redesign a new website for the client.

> There are a variety of other design considerations related to the total product life cycle. For consumable products, some of these life cycle factors might be of lesser importance (Crow, 2002).

Crow (2002) suggested that life cycle factors might need to be addressed during product design include:

1. Testability/Inspectability
2. Reliability/Availability
3. Maintainability/Serviceability
4. Design for the Environment
5. Upgradeability
6. Installability
7. Safety and Product Liability
8. Human Factors (Crow, 2002)

Crow (2002) said that: 'The relative importance of these factors and their orientation will vary from industry and product to product'. Kotler and Hall (2002: 45, 111, and 248-252) introduced: 'A contemporary review of the product life cycle' (Marketing Management 11th ed. 2002). This contemporary life cycle related design focus includes design focus-Introduction/ Tuning, Growth/ Scaling, Maturity/ Support, and Decline/ Transition. This concept would be a good way for web designers to consider the life cycle of a website when planning and preparing for the future and their responsibilities to face other challenges from other websites with similar characteristics. During the introductory phase, they should work closely with early adopters to refine and tune products. During the growth stage, the design focus is on scaling product supply and performance. During the mature stage, the design focus is on customer satisfaction through performance enhancements and improved support. During the last stage-decline-the design focus is on facilitating the transition to next

generation products. To design for life cycle will supply a new sort of website that can approach the client and users' need. Figure 2.24 shows the product life cycle. Figure 2.25 shows a contemporary review of the product life cycle.

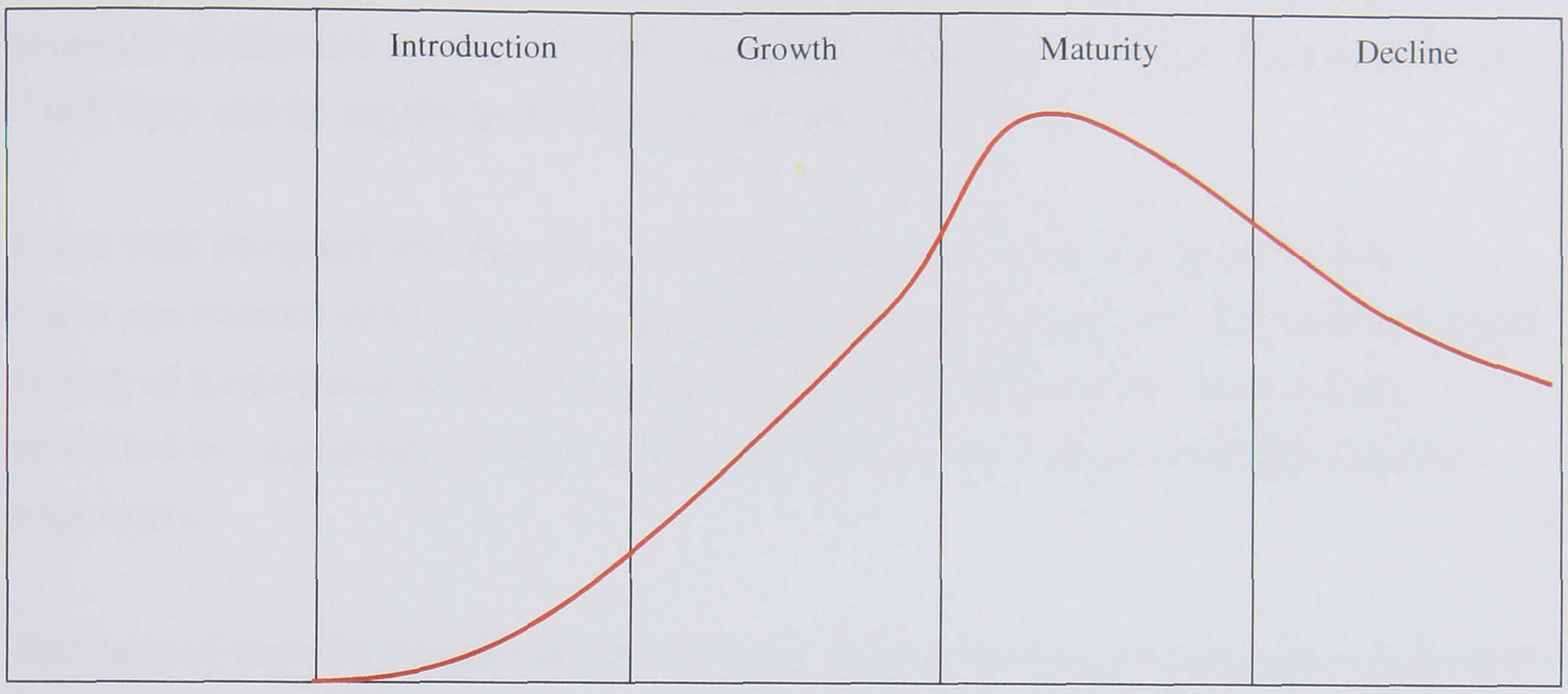
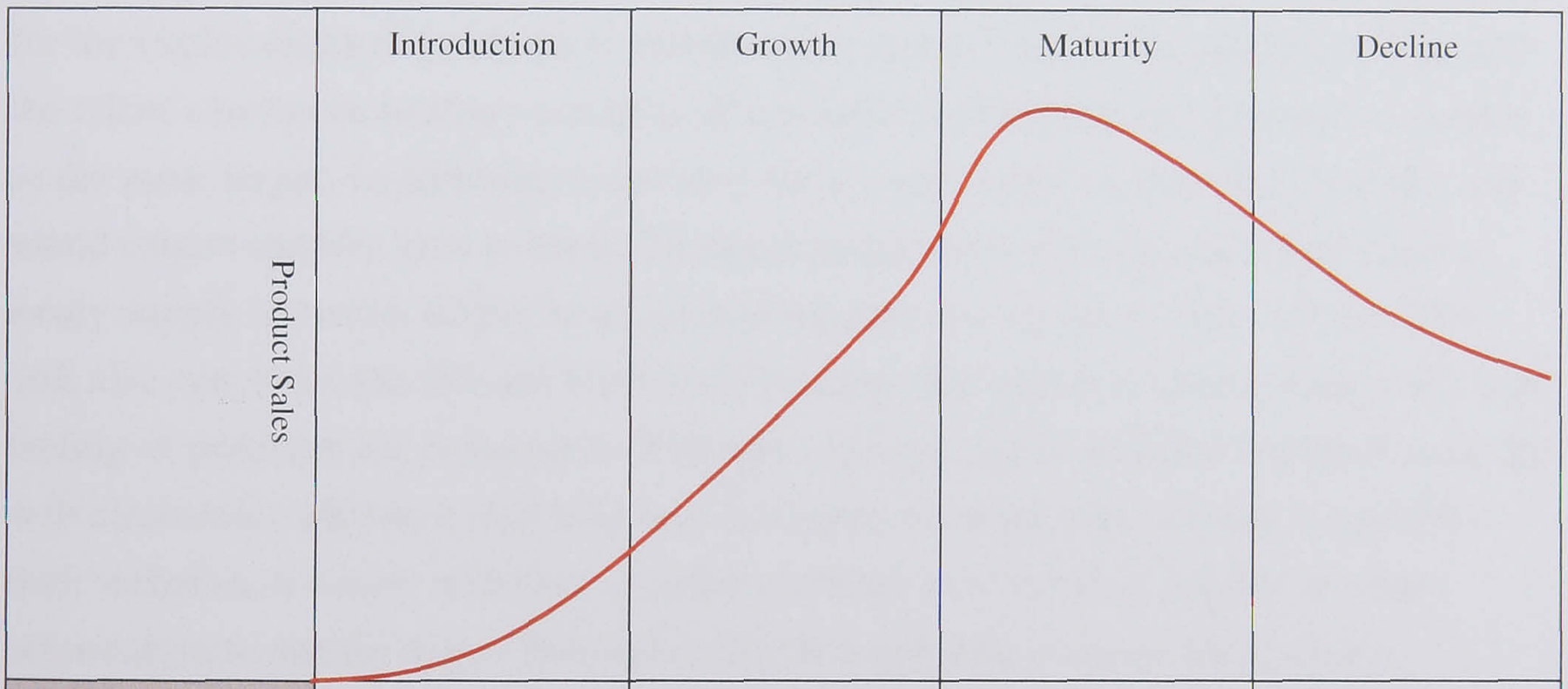


Figure 2.24 the product life cycle (Vernon, 1966)



Audience	Early Adopters	Mainstream	Late Adopters	Laggards
Market	Small	Growing	Large	Contracting
Sales	Low	High	Flattening	Moderate
Competition	Low	Moderate	High	Moderate
Business Focus	Awareness	Market Share	Customer Retention	Transition
Design Focus	Tuning	Scaling	Support	Transition

Figure 2.25 a contemporary review of the product life cycle (Marketing Management 11th ed. 2002)

Website design can follow the product life cycle in order to approach the client's needs and the development of business strategies. This area of approaching the post-published website on the Internet is also the designer's responsibility. To follow

the product life cycle, what should be noticed by web designers, and is website design the same as product design in this field?

Norman (1998: 183) distinguishes between computers and other products: 'The computer is unusual among machines in that its shape, form, and appearance are not fixed: they can be anything the designer wishes them to be'.

Some well-designed websites also provide a variety of changing faces for users. Users can control tool bars to change the positions of the products. To imitate the real feeling of having contact with the product, this sort of behaviour is not usually permitted for consumers to do in a shop but Web Design can provide this task for consumers.

This type of website design can satisfy users' deep emotions about products and carry out the functions that clients want to do but are not usually allowed to consumers. By increasing the loading time in the future, web designers can create more functions for the explorations of products to satisfy users' need. Combining product design and the client's business strategy can help all essential relationships to approach a similar or the same target. In addition, it can also satisfy consumer's needs that even the real world cannot usually give to them. To develop the items that the real world cannot easily supply for users might be an interesting area for web designers' efforts. This task also can solve the old and traditional concept that websites cannot supply the real feeling of products for consumers. Web user surveys, users' detailed feedback, and the web electronic calculator also help web designers to judge past strategy to modify their websites or renew web data in order to create new items or supply on time information to satisfy users. Winograd (2003) supplied a concept about user's requirements. The professional website is not only limited in performance but how good it looks or how multi functional it is. After the design process, the content of websites (change on time web data and improve technical problems) and judging the decline point in order to create a new website might be easier to determine than before.

Due to technological developments, website design is not only limited to performing on a computer screen. It can be connected to the Internet by interactive television, personal digital assistants (PDA), and mobile phones (3 G mobile phones). Moreover, following the development of the wireless environment, the next step might be to reduce extra costs and give maximum accessibility to users. It is definitely true that to develop a good web environment is more important than only to develop pure website

design.

MacDonald (2003: 12 and 13) outlines a short history of the Internet and digital computing, as shown below.

1. **1940s:** Foundation of computing and human-size computing
2. **1945:** inventing the Internet: In 1945, the US Government adviser Vannevar Bush proposed the Memex-half-computer, half-Web site. Post-World War И US President Eisenhower established a high-tech research agency, and its early head JCR Licklider moved its focus to information processing. During the same period, Bob Taylor (in the mid-1960s) commissioned the ARPA network. In addition, Ted Nelson (in the mid-1960s) developed the concept of hypertext.
3. **1950s:** Commercialisation:
4. **1960s:** The computer industry, Mini-computing, new digital generation, and human factors: Douglas Engelbart (the Stanford Institue, 1980) pioneered many developments that made computers more usable. Human factors in software became established in the 1980s as Human Computer Interaction.
5. **1970s:** Affordable computing, killer applications and PCs, and pioneering user interfaces:
6. **1980s:** PCs became corporate: IBM addressed the personal computing market with the 1981 PC Jr, which ran the Disk Operating System (DOS) with Bill Gate's Microsoft. The IBM PC used an Intel chip and created a standard platform for personal computing.
7. **1984:** Operating systems for all: Steve Jobs (1984), inspired by the work at PARC, led the development of the Apple Macintosh, launched in 1984. During the same year, Susan Kare (1984) designed elements of the user interface including screen graphics and fonts and Steve Wozniak (1984) provided the engineering genius.
8. **1995:** From the Internet to the Web and from textual to graphical: Vinton Cerf and Bob Kahh (1995) co-created TCP/IP, the core Internet protocols. Tim Berners-Lee (1995) proposed the World Wide Web (WWW.) and created the first Web browser and server. In addition, Marc Andreesen (1985) pioneered the Mosaic graphical browser. Andreesen co-founded Netscape, while Microsoft tried to compete with AOL and other companies, launching its proprietary online service in 1995. The Web became the dominant online platform.

9. **2002:** 3 G mobile technology and other personal digital assistants (PDA, which can be used to connect to the Web): The Web showing on 3 G mobile phones and personal digital assistants (PDA) use another type of web pages. Each of these equipment owns its particular system to viewing web sites from the Internet. Will the Web reach a stage where all equipment should be modeled in one form?

This development leaves one fact that needs to be considered. It took forty-five years to transfer the Internet to the Web but only seven years to put these functions on many different type of equipment. The quick and wide development, this requires consideration, but most people ignore it.

In my personal opinion, it might be better to combine the development of software design, product design (digital devices), and the future Internet together in order to decrease their differences. In this research field, many areas remain to be discussed and need to be discussed in the future. How can designers develop the future Internet in order to reduce the extra cost and enhance the content of the Internet for individuals? To reduce the extra cost, it is possible to adopt one or two equipment types with multi functions instead of other unnecessary equipment. The highest level for many designers is to design for people not only to design for business. Papanek (1963: 230-270) stated the design responsibility: Five Myths and six Directions shown below.

Five Myths:

1. The Myth of Mass Production
2. The Myth of Obsolescence
3. The Myth of the People's 'Wants'
4. The Myth of the Designer's Lack of Control
5. The Myth That Quality No Longer Counts (Papanek, 1963: 230-270)

Six Directions:

1. Design for the Third World
2. Design for Teaching and training Devices for the Retarded, the Handicapped, and the Disabled
3. Design for Medicine, Surgery, Dentistry, and Hospital Equipment
4. Design for Experimental Research:

5. Systems Design for Sustaining Human Life Under Marginal Conditions
6. Design for Breakthrough Concepts (Papanek, 1963: 230-270)

Although these five myths and six directions were written for product design, Papanek stated a fact that really reflected the social situations and problems at that period of time. Through his observations and considerations, he really thought deeply about the real responsibility for designers. Some items still can be adopted for current designers to develop their tasks. The myth of the people's 'wants', the myth of the designer's lack of control, the myth that quality no longer counts, and the six directions are still useful for designers at present. Web designers might not have direct relevance to all topics, but some of them still need to be considered. The first policy for all designers is that the design outcome should not cause pollution problems and damage people's health. The second one is to reduce the source costs.

In addition, the installed place is a very important consideration at the present. To construct a wireless environment for our life belongs to the future plan of many cities but for some places it is not suitable to be installed. Do we need to evaluate its influence before constructing it? As people know, hot points have been set on the train from London to Brighton or in many UK airports. Similar environments are being constructed allover the world at the present. What will be the influence of this changed environment and will it be controlled well during this development? The development of digital time is quicker than before, even quicker and bigger than the industrial revolution. And its influence must be bigger than any other up till now.

2.5 The necessary design rationale and considerations for website design

Not long ago, designers were electronic generalists. Designers studied art, science, technology, marketing, and culture in order to approach the basic workings of nature. Over a short period of time, the quantity and complexity of accumulated knowledge has led to increased specialization among designers, and breadth of knowledge has increasingly been traded for depth of knowledge. This phenomenon continues up to the present. The designer interested in learning about other areas of specialization might have to study information or knowledge from many different design principles. The use of well established design principles may increase the probability that a design will be successful. To adopt universal principles of design as a background resource to increase designers' cross-disciplinary knowledge and their understanding of design, designers should promote brainstorming to generate ideas for their design problems and check the quality of the design process and any types of products.

> The best designers sometimes disregard the principles of design. When they do so, however, there is usually some compensating merit attained at the cost of the violation. Unless you are certain of doing better, it is best to abide by the principles (Lidwell, Holden, and Butler, 2003: 11).

The principles are like basic guidelines for learners to help them to avoid making too many mistakes during the design process, but advanced design is needed to break these rules by designers' efforts, just like artists create new styles in their works. They learn from the traditional skills or concepts but need to break these rules in order to create new things in their work.

2.5.1 The language of website design

What is meant by the language of website design? As a child learns a language in order to communicate with others, a web designer needs to learn a different type of vocabulary in order to enter the world of website design. Website design is no different from other design processes. A well-designed website contains three key elements about good functions which concern user-centered design, a lot of content with on time and suitable information, good graphic design, and interface design on the computer screen. To consider graphic design, form, digital colour, and the world concept is highly relevant to website design. Form and positions are the compositions of the fundamental elements in a design. The shape, proportion, balance, and harmony belong to this field. Understanding and using good form comes from developing the design ability to see the intrinsic qualities of design elements and the relationship between them. In addition, digital colour plays an important part in website design decision and production. The digital colours which are chosen for website design will not only provoke psychological and emotional responses, but may be also needed to support and enhance the form aspects.

Furthermore, the world concept refers to the design idea or thought behind a design. The thought process that web designers go through when they absorb and develop a client's brief are a vital part of finding a website design solution to a particular design problem. In addition, navigation and variable design elements are also very important for website design. Above all, these components constitute the language of website design, form and positions, digital colour, and the world concept belonging to the field of traditional design. Navigation and other web design elements belong to the field of interface design and website design.

The form considerations for website design might be focused in two directions. They are web layouts and individual image arrangement. The first consideration is focused on creating an approachable atmosphere for design tasks. The second consideration may be based on the quality of images and their arrangements. Furthermore, colour arrangements also have their influence on web layouts.

Leu (1992: 213) introduced Arnheim's standard. This standard helps web designers or other designers relevant to image design to develop their design tasks. In addition, it is usually used in design teaching. This standard might need to add proportion considerations. No standard shows what is the best policy for web designers to arrange the proportion between images and texts on web pages. This method, combined with the 80/20 rule, may be a solution for designers, as shown below in table 2.26.

Table 2.26 Arnheim's Standard (introduced by C. L. Leu, 1992)

Arnheim's Standard	
Symmetry	Asymmetry
Simplicity	Complexity
Upward	Downward
Degree of weightiness	Degree of lightness
Darkness	Brightness
Openness	Closeness
Low tension	High tension
Homogeneity	Heterogeneity
Consonance	Dissonance
Hierarchy	Coordination
Dominance of the whole	Dominance of the parts
Endlessness	Finiteness

However, text also needs to be considered as another type of form. What sorts of arrangement with text and images can supply viewers with the best emotion for reading websites? It is well known that many people dislike reading screen based text. Although this design problem also belongs to technology, web designers may take measures to solve this problem in order to minimize its difference from real reading. This also can help to decrease real source costs. Form and space, negative and positive space, and composition are very important for web designers in constructing basic web pages with good digital colour use in order to meet the demands of

harmony. The final stage, the standard of aesthetics, is the final result that can approach harmony.

> The term layout refers to the way in which we organize the disparate material that makes up the content of a design. Your aim is both to present information in a logical, coherent way and to make the important elements stand out. Use of a grid and consistently styled elements also helps the reader to absorb information in a visually pleasant way (Dabner, 2004: 16).

Through this thought, the text on the navigation bar should stand out more than the text of the content. But the text of the content takes up the majority of the web page, and so it might be better to decide the text of the content first, then to highlight the text on the navigation bar. In many cases, there is a mixture of pictures, captions and copy, in the form of both headings (display type) and main copy (text part), and so many design items require the designers' particular experience to decide or modify the site design. Although this is a fact, it still remains that there are some suggestions and basic rules from the tutorial handbook. This advice might be a solution for initial learners to achieve better design outcomes. For the navigation considerations, colour change with previous browsers is a necessary design for websites. This design can decrease users' time spent searching another topic. Wean (2005: p.1-4, p. 4-7, p.4-8, p.4-9, p.4-10, and p.4-11) made a survey of about fifty Chinese websites with high web hit rates. Tables 2.27, 2.28, 2.29, 3.30, and 3.31 below describe the website design arrangements.

Table 2.27 the analysis of logo positions (from Wean, 2005)

Logo Position	Left-High	Middle-High	Others
Percentage	92 %	6 %	2 %

Table 2.28 the analysis of navigation bar positions (from Wean, 2005)

Navigation Bar Position	High	Middle	Right	Left
Percentage	61 %	29 %	6 %	4 %

Table 2.29 the analysis of search positions (from Wean, 2005)

Search Position	Right-High	Left-High	Middle-High	Others
Percentage	30 %	30 %	25 %	15 %

Table 2.30 the analysis of login positions (from Wean, 2005)

Login Position	Right-High	Left-High	Middle-High	Others
Percentage	40 %	30 %	21 %	9 %

Table 2.31 the analysis of help positions (from Wean, 2005)

Help Position	Right-High	Low	Others	Left-High	Navigation
Percentage	50 %	20 %	16 %	7 %	7 %

Despite language difference, eastern websites and western websites do not have any particular difference in their web layouts at present. The reading motion of eastern people also has a similar direction to that of western people. This data does not mean that web designers need to follow this rule but it should be considered in the design process. However, when designing long web pages, this sort of design can easily cause users inconvenience. A suitable length and width consideration is necessary for designers to design their web pages.

In the art field, some layouts are useful for web designers. The straight-line layout can create a sense of peace emotion for the viewers. The X line layout can increase the depth of the screen. In addition, the round or square layout can create an impact on the screen for users. Above all, there should be overall consideration about the web layout.

2.5.2 Digital Colour

Colours exist in the world by means of reflection in human eyes. Digital colours also possess a similar characteristic. The main difference is their produced process; colours result from nature, but digital colours come through artificial reproduction but the final target is also to reproduce nature for individuals. What is the importance of colour use in website design? To enhance the usability of digital colour and to decrease users' eyestrain through long term use may be very important factors in this research field.

The discussion on ways to enhance the usability of digital colour can be divided into two fields. The first area is the traditional concepts about colour use. The other area is to search for efficient methods for using digital colour in order to create harmony on the screen.

In the first part, it is essential to understand colour definitions, colour differences and

legibility, colour contrast and harmony, and colour in information design. To use colour efficiently based on long term experience in learning and practicing requires a sense of aesthetics. But it is still not easy to use colour efficiently, just like practicing a sketch, while it may be easier to use only a few colours for initial users to achieve success in colour use. This approach helps users to create harmony in colour use on the screen easily. In the second area, it is essential to supply a contract table about digital colour and traditional colour for users. This method could help users who are familiar with traditional colour to transfer to digital colour, a field that was discussed in my MA dissertation. As users know, the colour selection tool on many types of software is limited to a small area. To supply a sort of colour selection tool for users can help them to choose colour efficiently on the digital colour selection palette. Wellstyled Company (2005) supplies a digital colour-selection tool on the Internet. Examples are shown in Figures 2.32.

Figure 2.32 WellStyled Company digital colour-selected tool (http://wellstyled.com/tools/)

This tool can help users to compare their colour use efficiently on the screen and so modify their colour use. In addition, it is possible to mark the digital colour codes used in the colour selection palette on the software.

In the current situation, web safe colour use is necessary for web designers. The text parts of websites can be classified into three different parts. They are the title, the main content, and the navigation bar text. Different parts should have different

considerations in the design process. The text in navigation bars should be considered at the function level. The text in the titles need contrast to can stand out from the screen and attract users' attention. Finally, the main content text should be considered to reduce users' eyestrain. To enhance the usability of digital colour, it is better to construct a personal digital colour palette in the software. Through this method, users can use colour efficiently in designing. To adopt cold colours on web pages is easier than to use warm colours. In addition, to use saturation on colour is easier than to use the contrast colour to create harmony on the screen. Although a website consists of several different web pages, this does not mean that each page can use colour individually. It might be better to have different colours on different levels of web pages but there also needs to be some sort of relationship between these web pages.

> The impression of colour in our brain is only created through the effect of light on the one hand and on the other the human reaction to this purely physical attraction and the reception via the eyes. In colour perception, various physiological phenomena can be observed (Lewandowsky and Zeischegg, 2003: 138).

Viewers can perceive and objectively identical colour differently, depending on its surroundings. Colour existing on web pages should not be considered to be limited only to colour codes. The surroundings strongly influence the usability of colour. Gray, black, and white are important colours to create a balance situation among other vivid colours. This method is widely used in modern art. To adopt this skill, it is easy to combine vivid colours together. To enhance the usability of colour, it is vital to practice and understand colour combination and its effects. To enhance the usability of digital colour may be considered in two different ways in the design process. They are colour performance considerations and colour limitations. Colour performance considerations are colour use, web safe colours, and colour performance in different surroundings, that may result from software, hardware, or multiple influences. Colour limitations mainly result from the differences in cultures and the consequent meaning of colours. Furthermore, linking colours cannot be ignored in the web design process.

> In general, you should set the link colour to be somehow brighter or bolder than the visited link colour. A toned-back visited link colour better communicates a less active state (Niederst 2001: 324).

Screen-based media are having an increasingly greater impact on our daily lives.

Televisions, computer displays, and front projects all belong to the range of screen-based media. Through the development of technology, people will have increased opportunities to use screen-based media to access information. An increasing amount of information is received in an on-screen format. This idea is very beneficial for many computer users if each web designer could observe this point about colour use in website design. The use of digital colour for mapping web information and structuring these is a key factor in good website design.

> Low levels of resolution combined with low refresh rates make reading from a screen hard work. Good choice of colour on the screen can contribute significantly to reducing strain on the eye. The contract in brightness affected by combinations of colours is the most important consideration when trying to maxmise readability. A discrepancy in brightness of between 40 and 90 % ensures easily readable texts. When designing, care should be taken to ensure that there is contextual congruity between the on-screen representation and what it signifies: activity can be shown by means of increased saturation, more colour, sharper focus or added contrast (Zwick and Schmtz, 2003: 106).

Dynamic changes in colour tone, brightness, contrast and saturation can greatly enhance the navigational concept of the website. By reacting to the movements of the mouse cursor, alterations of this type can give the user feedback and aid orientation. Zwick and Schmtz (2003: 110) supply an example of the comparison of link colours in their book. This idea can also give web designers much inspiration when designing links in the design processes. It is an ideal choice for colour to add structure to a layout–related subject matter, which can be colour coded and clearly marked off from other subject areas. On the Internet, where the complex array of links making up a website requires an intelligible structure, colour coding can be particularly helpful. Colour helps to structure components logically and enables clear demarcation. When designing web pages, this concept also helps web designers to change colour text links in designing the site and content pages. Colour change website design is a new design outcome that allows users to make more choices directly on the Internet. It is necessary for designers to add the sound control buttons, the colour change control buttons, and the basic control buttons for the Internet animations.

2.5.3 The world concept

The world concept is always behind design but needs to be considered more than ever before. Especially in website design, many target audiences are invisible. It is now

necessary to add this consideration into the design process. Different cultures establish different thinking, different likes, and different dislikes.

Cultural studies play an important role in this research field. Any design might be necessary to be based on the cultural level in order to create depth. A website with different languages might be the first step towards constructing a world concept for users. The interesting thing is that many Asian or non-English websites have this function for users but relatively few western English websites incorporate this function for users. Different national web designers all think about this point, although English is the international language. If a good website can be constructed, this function might be necessary to be considered in order to be accepted by more users. This function has been constructed in Windows XP Service Pack 2 and Windows Vista. Users simply change certain settings to obtain their language platform. The influence of different cultures on website design may be observed in the use of language, limitations in colour use, limitations of religion, and so on. When creating an international website it is essential that designers seek to create something that has the ability to grow. Actually, web architecture looks like spider diagrams. It might exist in a website or on the whole Internet. As we know, users need only search with simple key words to find a numbers of adult websites on the Internet. These websites are normally unavailable to younger people. This is a sort of invisible pollution of the Internet. This situation should be controlled and needs to be controlled well for users. When professional designers design these searching engines for users, they should take responsibility for society and for this world. This problem is not difficult to be control in the environment of the Internet.

Between website design and traditional graphic design, navigation and motion are probably the greatest differences. Navigation is better if it follows human physical activities. Users should know what to click on and where to look without being told. This is why interface design becomes very important for website design. Many websites were designed to make it difficult to distinguish the internal link from the external link. This sort of design ignores users' emotions. For example, a famous website – Yahoo - does not clearly distinguish the navigation. Users can easily access other business advertisements on the Internet. In addition, dropping advertised images or jumping advertised windows adversely affect also user's emotions. Moreover, to break up the layout of the whole web page is not a good idea for professional websites, especial in different devices and browsers. The design problem is that different browsers and devices show different visual performances for users. It might be better to give more control abilities to users because they are the real power on the website.

This user-centered concept should be considered in the design process. It is necessary to collect user's dislikes in order to determine their likes. The best rule is that it may be better to provide less than to provide negative emotions for your consumers.

The loading speed is the second item to be considered in this field. Many users think that as soon as possible is the best policy for website design. To cut the whole web page, to select the quantity of images (it is better to adopt a small quantity of images), or to incorporate programmes together can be beneficial in solving this design problem. Generally speaking, various image formats are available for use on the web, the most widely used being JPEG and GIF. The major considerations when choosing the file type is the type of information that the designers are saving. JPEG files containing millions of digital colours might be good for saving photographic information on the website. GIF files have reduced digital colour by comparison and so are better for recording solid areas of colour information, such as single colour samples, logos, or navigation buttons. Moreover, web designers currently adopt Flash to design web menus or many items with animations or loading files to play as sort of negotiated websites for users. Through adding more web design elements to the website, the web design team might face more design problems than before.

Developing design and visual concepts are both important when constructing an affective/effective website. As web designers gather together different web material about the web organization and their web elements, it is best in the initial stage to make the project as broad as possible. It is essential to think about the whole web organization and its purpose in order to capture the design spirit in the design process. Website design is no different from any other design process and this means the more organized the website is, the more successful it will be. As far as website design is concerned, not only adopting traditional design methods for investigating web design but also using an overall consideration to check all the whole design process may be beneficial in developing it. This produces a complicated problem for the web design team. In the field of website design, building an affective/effective website no longer belongs solely to designers. This fact also suggests the importance of professional knowledge. By investing in consumers continuously, the results can transfer to designers in order to update the content of the website, which is very important for maintaining the quality of the website after publication.

To enhance the usability of website design depends on the design team consisting of the designer and the programmers, clients, and users. These should be consulted at each stage in the design process. Through the discussions with the client, the design

team can clearly define the target of the web project and create a better idea to approach the aim of the website. Moreover, through a suitable test or useful feedback from the target audience, the design team can evaluate the design outcome correctly.

Lidwell, Holden, and Butler (2003) wrote 'Universal Principles of Design' which defines 100 relevant principles in order to help designers to build their professional experience and observations. By adopting these traditional principles or concepts, designers can approach the demands of academic design and is a logical method to develop the project in different design fields. Although some great designers deny that their design thinking or the outcomes result from these principles, they are almost all contained in it. At least, this knowledge is necessary in the learning process. Lidwell, Holden, and Butler (2003) choose thirty principles to recommend to users in order to enhance the usability of a design. These are the 80/20 Rule, Accessibility, Aesthetic-Usability Effect, Affordance, Confirmation, Consistency, Constraint, Control, Cost-Benefit, Entry Point, Errors, Fitts' Law, Forgiveness, Hick's Law, Hierarchy, Iconic Representation, Immersion, Interference Effects, Inverted Pyramid, Layering, Mapping, Mental Model, Mimicry, Performance Load, Progressive Disclosure, Readability, Recognition Over Recall, Signal-to-Nosie Ratio, Visibility, and Wayfinding. Many different principles related to website design are individually adopted in different design processes or stages. For example, Mapping is widely used in the initial stage of website design and web surveys. Since people are familiar with using maps, Mapping can supply a familiar experience for users. It is beneficial for controlling the relationship between controls and their movements and effects. It might be seen as small in enhancing a visual effect or big in constructing a whole organization of websites or a web design project workflow. These principles sometimes appear in the design process or design outcome in different combinations.

Principles act like invisible tools to help the web designers to build their websites with logical thinking. To enhance the usability of the website design, it is necessary to research into interface design. Although website design does not equip all of the design elements with an interface design for product design, many website design outcomes need to present a real product for viewers, so that interface design has its importance in website design. The UCD concept has been central to interface design, product design, and emotional design. To evaluate website design related to these design fields, UCD should be adopted by web designers.

> While web design developed from graphical user interface (GUI) design for software it has never wholly adopted it. This is partly due to bandwidth

> constraints and the nature of HTML and also because GUI is not suitable for all web products. However, there is much value still to be gleaned from GUI, which is fairly successfully used by hundreds of millions of people and have continued to evolve-through they have also adopted some interface concepts from the web (Macdonald, 2003: 110).

Drawing is relevant to website design because it is used from the draft of the website plan, visible subjects, to the whole visual effect of the website to viewers. It is important to create a balanced situation between the colours, shapes, tones, and spent navigation based on the basic importance of website design. These experiences require extended time for web designers to practice and learn how to use particular aesthetic viewpoints to observe each detail. To increase the appeal of website design depends on the leader of the web team and others' efforts.

From paintings to website design, there remains a common point to achieve their outcomes and to approach aesthetics although they are created by different tools. Czene supplied a painting concept about shapes. This is a basic rule: to observe the object and transfer it into its pure form in order to search for the key structure in the aesthetics. Too many items can easily destroy the viewer's observations so they are not justified. A website consists of many different individual design elements; to ignore many details is helpful to increase the appeal of website design. Although website design does not possess the same value level as art, to develop or build a website in a similar spirit may help to create something different.

Increasing the appeal of website design might be divided into two different research fields: visible and invisible considerations. Visible considerations are layouts, colours, and web contents. In addition, invisible considerations are spent navigation, movements, and methods to enhance publishing websites on the Internet. It is essential to combine these design elements to create 'fun' for users. Website design is dissimilar to product or other real designs, where designers can modify their strategies from the selling account. It does not use a basic standard to justify whether a website is effective or not, but this is vital for website design in order to help it to develop successfully. Through the research about people, these statistics can help designers to develop their designs more for users. Lidwell, Holden, and Butler (2003) chose twenty-eight principles to enhance the appeal of design.

Although it is difficult to follow every principle to build a website, especially to consider about web layouts, the rules of composition may help designers to achieve

certain basic visual effects at the initial design stage. In addition, these considerations also help to build better usability. To design for usability, this consideration is a very important difference to consider layouts for website design with paintings and graphic design. For examples, to arrange the position for the clicks is very important for website design when constructing layout.

It might be better to adopt not only the designer's perspective when planning a web project. This topic was discussed briefly in the previous paragraph. To make better design decisions for website design is not only limited to design thinking. This reflects how website design is multi-faceted. The first one is to decide the content of the website by consulting professional people's opinions. This may be through marketing research, the demands of the clients, technological challenges, or other considerations. What is needed from web designers in this field? In other words, the role of the web designer might be the focus for their jobs. Different people have different opinions about this question. Functionality is not the first element to be considered. The website is a sort of visual product with functions to transfer something to someone by technology. However, it is doubtless that content is the basis for all websites. This basic spirit should not be ignored by web designers.

After choosing the content, the responsibility of web designer is to make this content stand out, to use design skills to increase the appeal of website design. Because websites consist of HTML language, programmers are definitely required in this area. It is certain that constructing a good website needs their efforts and contributions. Lidwell, Holden, and Butler (2003) chose twenty-seven principles to help designers to make better design decisions for website design. But these principles are the internal considerations for web designers, and it does not mean that there will be no conflict with other considerations. The corporate relationship is worth exploring.

2.6 The Future Development and Challenges for Website Design

The future development and challenges for website design is divided into two main fields, which are the environment of the Internet considerations and the quality of websites considerations. The aim is to search for an appropriate method in order to enhance the quality of websites and supply a more convenient environment for users.

2.6.1 The environment of the Internet considerations

Future possibilities and challenges for website design can be considered in new

network technologies, new software technologies, new devices, new types of work, new audiences, new areas of use, new concepts, new interface concepts, and organizational interfaces. The web has been used to explore many future possibilities for networked products or services, likes online banking, e commerce, spreading public information, and many different areas of past human activities and understanding about knowledge are currently transferring to the Internet.

To trust the service and to supply a more convenient service from the Internet are the future aims that actually needs well designed planning before construction in order to avoid wasting extra resources and causing pollution damage to people or to the environment. Among different research fields, people will need to consider this development carefully and continuously.

Broadband and wireless are parts of this new environment. Broadband supplies fast Internet connections for users. Wireless means supplying a boundless environment for people so that invisible cables can work for users and extend the Internet's length and width for usability. This improvement also fulfils the demands of aesthetics. The environment or surroundings will look better than the present, which might be a small place (i.e. a office) or a big place (i.e. aeroports or train stations). Actually, many design outcomes follow a basic rule of development, from the initial stage-the concept, the middle stage-the mature development, then the transfer to the final stage-the purity. At the initial stage, the design outcome may only own the initial idea and the concept to test the possibility of the development. After that, it can develop to the maturity stage that means people start to use and rely on it. Finally, the design outcome is requested for users so that it can provide usability and aesthetics.

At present, the Internet is going through the final stage of development. Much equipment is added to the wireless function. One such new technical product is a sort of USB desk phone-Skype. This development might replace our traditional equipment-telephones. After computers and printers developed, much old equipment and many types of careers were replaced. This fact reflects the importance of the Internet. Website design might play a growing role during this development.

To decide where it is unsuitable to set hot spots to construct this wireless environment, people should understand its electrical pollution and damage to human beings. Although this research belongs to the medical field, this information plays an important role in this field. As people know, many hospitals have a limitation in using mobile phones or passengers are not allowed to use any electrical equipment during

flights, especially in taking off and landing. Social promotion should play a higher role than merely to consider the promotion of business in this area. This is also a new responsibility for designers and technical people.

2.6.2 The quality of website considerations

To enhance the quality of websites depends on the understanding of aesthetics and adopting a suitable stage to combine traditional design consideration and technical developments. Research plays a more important role than the skills to use software in this development. From planning and organizing goals to designing strategies for a website and the individual web page design, there remain many details that should be considered from the initial stage to the update stage. Norman (2004b, 17) states that: 'Attractive things work better'. To enhance the quality of websites is necessary for the web development.

Web users do not always know where they are going or what they will find there. This uncertainty is sometimes exciting for users but not always. For example, it might be annoying for users, particularly when a long wait is involved.

> With content that is as technologically demanding as multimedia, it is especially important to give users enough information to make an informed decision before they click, so that they know what to expect and are prepared to receive your materials. High-demand content such as large multimedia files should not be part of your basic page design (Lynch and Horton, 2001: 203).

Through growing multimedia website design, this advice supplies a useful consideration and a basic guideline for web designers to enhance the quality of website design. Effectively using sound and animation may be a great new topic to enhance the quality of websites.

2.7 Summary

To summarize the literature review, its aims were to acquire knowledge and necessary information about website design and to search for an appropriate methodology for website design. Design methods have relevance to website design and thinking. These include graphic design, website design, and emotional design. The aim is to focus on how design research should be more prominent than other considerations. Design issues and the behaviour of web users can help to develop user-centered

websites. This is similar to emotional/affective design. In addition, the aim of the necessary design rationale and considerations for website design is to discover methods of combining traditional principles and technological items. In this way, website design might approach the demands of aesthetics and usability for users.

Website design covers a great number of different research fields. The technological development helps web designers to create more possibilities in website design but also adds more challenges in the design process. Dynamic website development efficiently supplies a brand new research field for designers to create pleasure and fun for web users. Sound may be a new research field to supply disabled people with a convenient web environment. Today, website design still contains many variable design elements which strongly influence its design outcome, like browser usage, platforms, user preferences, window size, connection speed, computer speed, colour support, software support, font support, and device support, although the original design idea still plays an important role in website design, as in other design fields.

> There are four main reasons users return to some websites and not to other websites. They are high-quality content, often updated, minimal download time, and ease of use (Niederst, 1999: 13).

In the design process, the aims of web usability are to create positive emotion-confident, convenience, and comfort for web users. Since web users belong to the invisible target audience and have more choice on the Internet, to search for users' demands is more complicated and difficult than product design. The problem is that user's demands and expectations cannot easily be figured out only through user usability testing. Web survey can sometimes reflect user's demands more than the results of user usability testing. Both user's demand and expectations are very important when building real UCD websites for users.

Website design should have a different direction to develop emotional design-to design for the three levels in the web design process. 'The 3C concept' is necessary to be considered in the design process in order to create design outcomes for users. Furthermore, dynamic web design development should now be more clearly considered in the design process. Interface design, loading speed, and navigation can directly reflect web usability for users. Loading speed has increased rapidly in recent times. This means that web designers can put more dynamic effects in their design outcomes. Spent navigation considerations are a new research area for website design and are worth discussing at present.

Norman (2004b: 17) states that attractive things work better, based on Kurosu and Kashimura's research. This concept points out why designers need to build better visual performance in websites. To adopt better visual performance on web pages can also enhance usability.

> Positive emotions are as important as negative ones-positive emotions are critical to learning, curiosity, and creative thought, and today research is turning toward this dimension (Norman, 2004b: 19).

Chapter 3 Initial Pilot Test (I.P.T.)

3.1 Introduction

This chapter consists of three sections, website choice and design processes for constructing a pilot test website, pilot test processes, and the results of the initial pilot test (I.P.T.) and research findings. The aim of the initial pilot test (I.P.T.) was to explore the range of website design developments and the perceptions of web users in order to decide the sort of websites and the next possible research process for the effective study of affective website design. This test process also supplied some useful experience for further effective study. The individual statistics for the mean values and standard deviations can be found in appendix A.

3.2 Website choice and design processes for constructing a pilot test website

Firstly, the website choice for the initial pilot test (I.P.T.) consisted of eight different sorts of website. The sorts of test websites were bank, car, insurance, sport, supermarket, TV channel, university, and two fashion websites in each group. Forty participants attended the initial pilot test (I.P.T.) because the evaluation formula (the mean value and standard deviation) to calculate requires more than six participants. In addition, usability testing needs four to five participants. To consider time, budget, and its possibilities, the number of participants was decided to use forty participants. The participants were divided into four groups from A to D in order to get a comprehension. This stage aimed mainly to search the scope of this affective research in order to undertake the future website impression test and minimize the research range. The images of the pilot test websites are shown below in figures 3.1, 3.2, 3.3 and 3.4. Website choice for this pilot test was based on age and location considerations. Because all of the participants were from the UK and belonging to the younger generation, the website selections were based on UK based websites which target audiences who belong to the younger generation. The aim of this consideration was to search for real target audiences and obtain their feedback in order to minimize the errors at this initial research stage. The initial pilot test (I.P.T.) was designed to produce a test website with these considerations in mind.

The pilot test website consisted of three pages: the welcome page, the test page, and the questionnaire page. The test page contained thirty-six websites and their individual links for the participants to supply direct observations during the test process. Table 3.5 lists the thirty-six website samples. The questionnaire page

contained a segment of the online questionnaire in order to provide the participants with a convenient test environment for conducting this pilot test. Nine pairs of adjectival nouns related to human emotional responses were chosen to use in this questionnaire. By ticking a point from 1 to 5 for each pair of adjectival nouns, the participants could complete the questionnaire in a short period of time and print it out directly. These adjectival noun selections will be discussed and shown later in table 3.6. On this questionnaire page, the print function was designed in CSS language. Some special IT design problems needed to be solved in CSS and Java languages in this design process. Other pages were designed using Dreamweaver software. Dark gray and highlighted warm and cold colours were selected for the colour scheme of this test website. Dark gray (#333333) was chosen for the background colour, pale pink (#003366), orange (#FFCC66), and blue (#99CCFF) were chosen for the main title and text colours. The choice of this colour scheme was to reduce the participants' eyestrain during the test process because it took a long time for each participant to observe nine websites. 'A discrepancy in brightness of between 40 and 90% ensures easily readable text.' (Zwick and Schmtz, 2003:106) 'The layout was designed in a square and block type in order to supply direct observations and reduce screw motions for the participants. Explanations about this pilot test were placed on the test and questionnaire page for the convenience of the participants. The size of the texts was larger than in normal websites in order to ensure better readability for the participants.

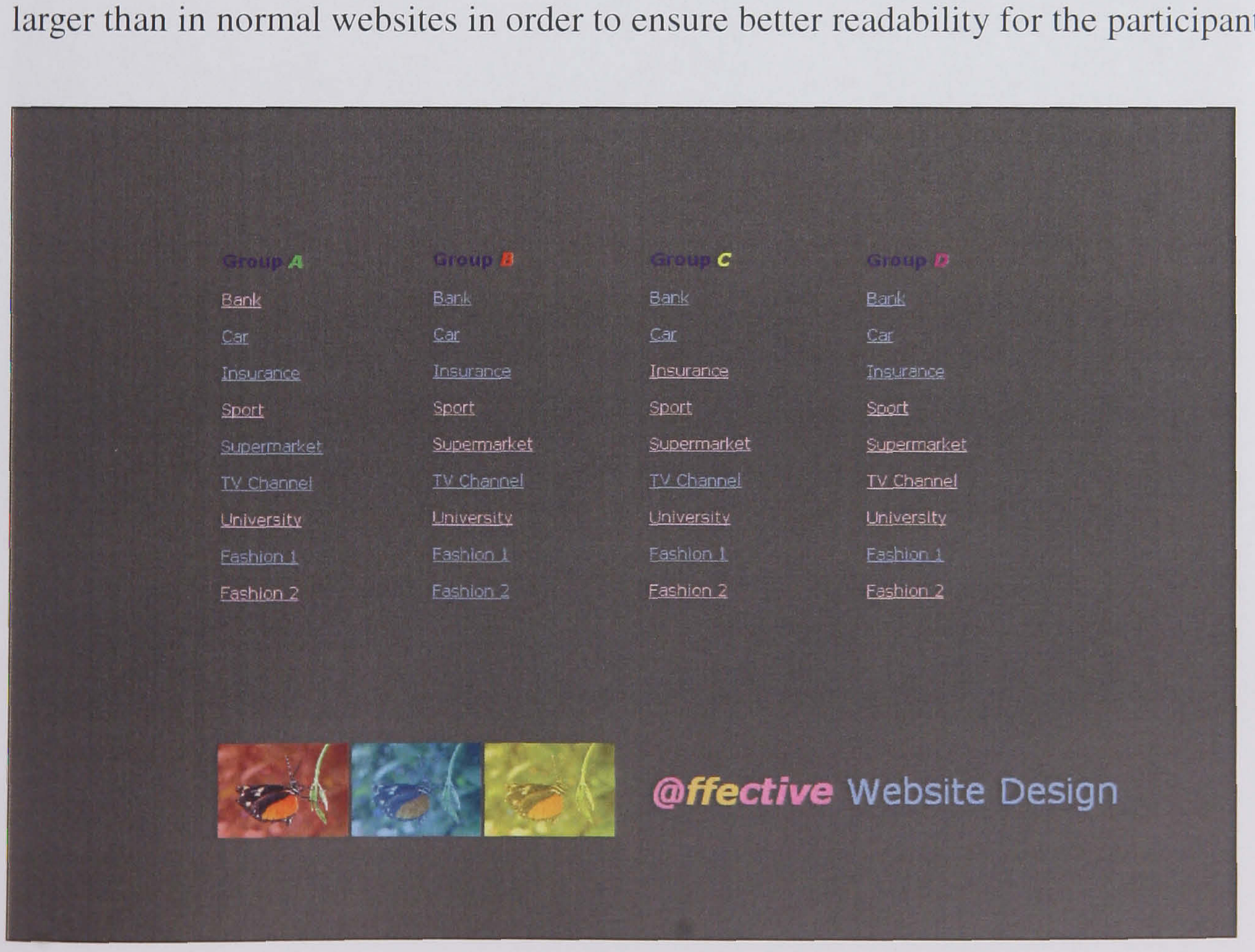


Figure 3.1 the original initial pilot test page

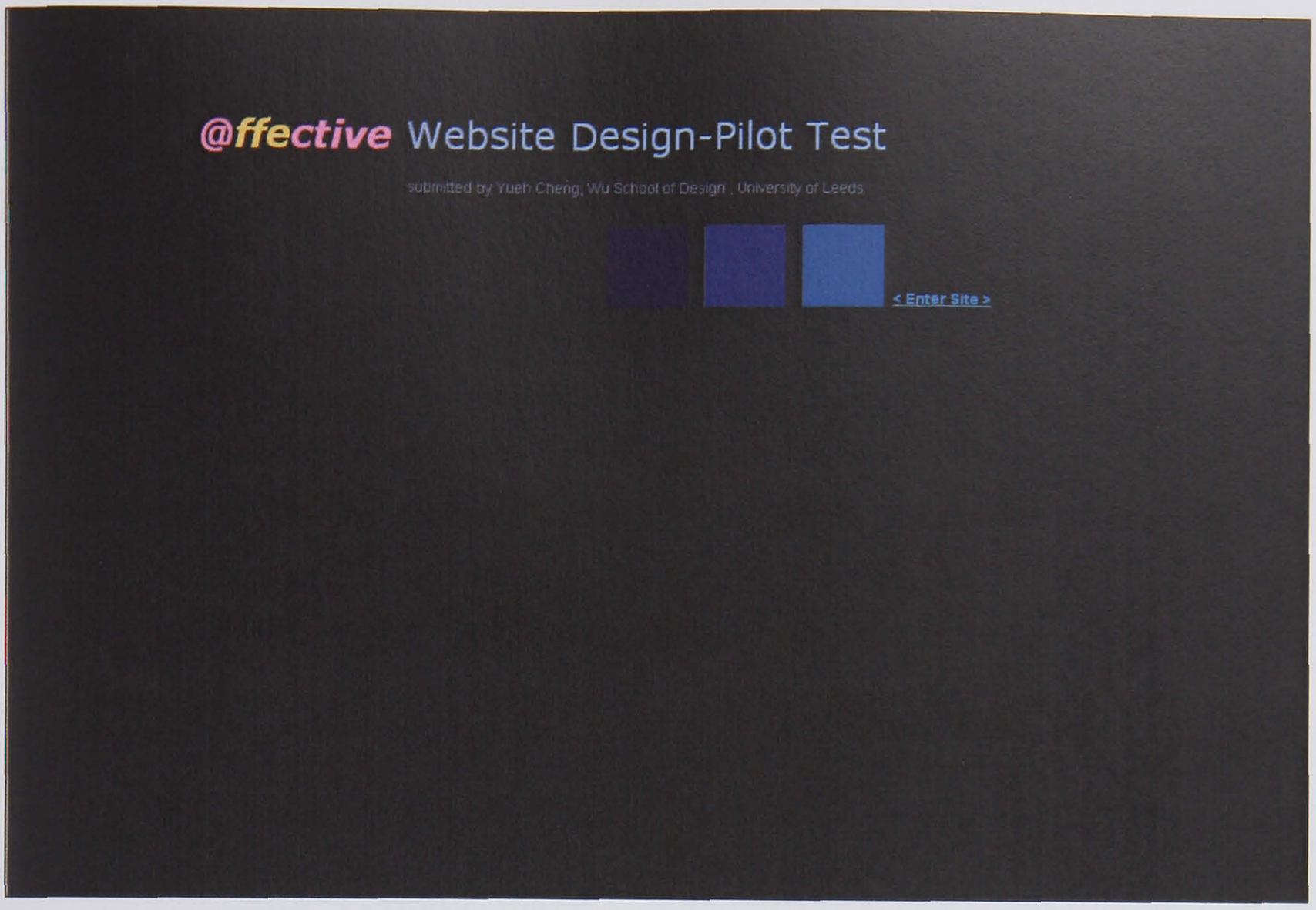


Figure 3.2 the welcome page of the initial pilot test website

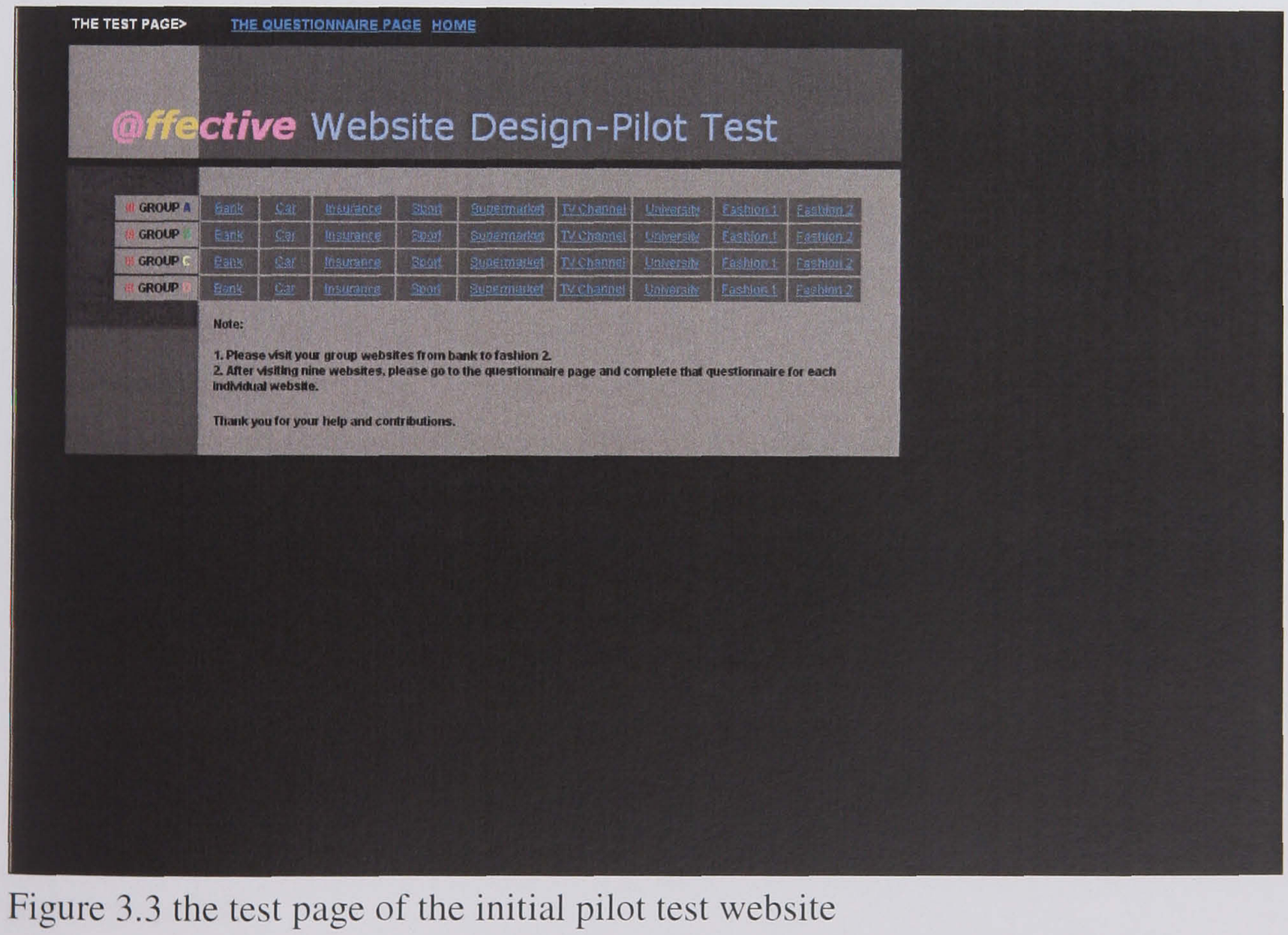


Figure 3.3 the test page of the initial pilot test website

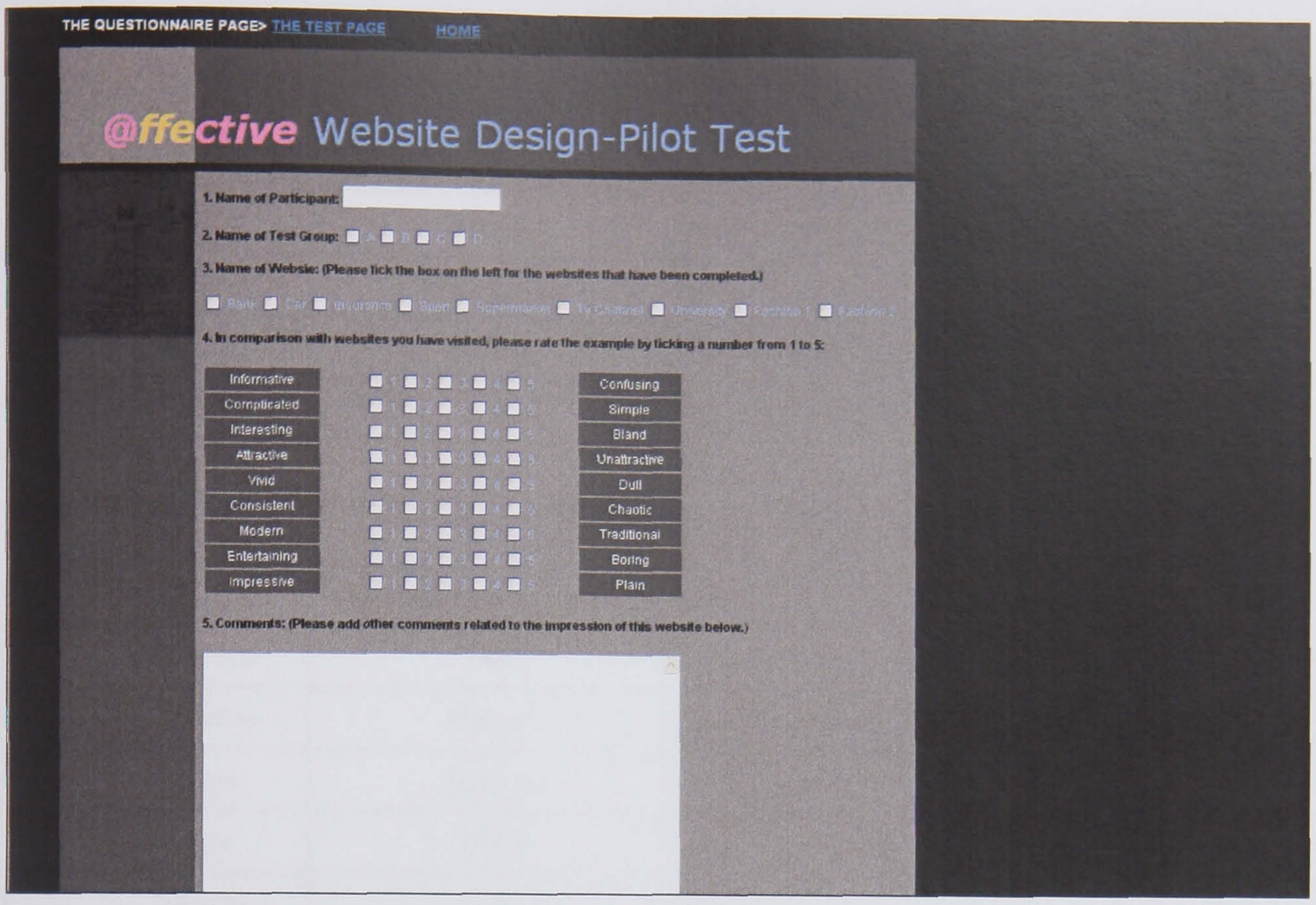


Figure 3.4 the questionnaire page of the initial pilot test website

The samples were mainly chosen from UK based websites, Taschen's 1000 favourite websites (Wideman, 2002), and websites 100% loaded (Lindner, 2004). The considerations in choosing the website samples were mainly focused on obtaining real users' feedback and using websites with a high conversion rate in order to identify more possibilities and obtain better test results from the initial pilot test (I.P.T.). Web conversion rates are more important than web hit rates for business considerations. This may form the foci for future website design development. The difficult area of this research was how to define and identify correctly the web conversion rates. The comeScore Global Networks Company supplied a web survey about this area (Lipsman, 2006). This paper listed the top 15 countries by average monthly hours online per unique visitor among visitors aged over fifteen. The worldwide average in this survey was 31.3 hours per week. This data may help designers to consider further the construction of the amount of content in the design process. In addition, the content consideration plays a vital role in enhancing web conversation rates. The website content includes several different areas which have a strong influence on the user's demands.

Table 3.5 36 website samples

All of the below websites were downloaded in the period from 22nd January 2006 to 8th March 2006.

Website Samples			
Groups	Sorts	Name of Website	Website Addresses
A	Bank	Lioyds	http://www.lloydstsb-offshore.com/
A	Car	Mini Cooper	http://www.mini.co.uk/
A	Insurance	Allstate	http://www.allstate.com/home/myhome.asp
A	Sport	Arsnel	http://www.arsenal.com/index.asp
A	Supermarket	Tesco	http://www.tesco.com/
A	TV channel	BBC	http://www.bbc.co.uk/
A	University	The Edinburgh University	http://www.ed.ac.uk/
A	Fashion	Disel	http://www.diesel.com/site.html
A	Fashion	Valisere	http://www.valisere.com/
B	Bank	Barclays	http://www.barclays.co.uk/
B	Car	BMW	http://www.bmw.co.uk/bmwuk/homepage/
B	Insurance	Iii	http://www.iii.org/
B	Sport	Liverpool United	http://www.liverpoolfc.tv/
B	Supermarket	ASDA	http://www.asda.co.uk/
B	TV channel	Channel 4	http://www.channel4.com/
B	University	The Cambridge University	http://www.cam.ac.uk/
B	Fashion	Cazal	http://www.cazal-eyewear.com/cazal.html
B	Fashion	1 of a kind	http://www.1ofakind.com.br/
C	Bank	HSBC	http://www.hsbc.com/
C	Car	Renault	http://www.renault.com/
C	Insurance	Insurance	http://www.insurance.com/
C	Sport	Leeds United	http://www.leedsunited.com/
C	Supermarket	Morrison	http://www.morrisons.co.uk/
C	TV channel	itv 1	http://www.itv-f1.com/Home.aspx
C	University	The Leeds University	http://www.leeds.ac.uk/
C	Fashion	Diasin	http://www.diasin.com/
C	Fashion	Guess	http://www.guess.com/
D	Bank	NATWEST	http://www.natwest.com/
D	Car	Toyota	http://www.toyota.co.uk/
D	Insurance	Progressive	http://www.progressive.com/
D	Sport	Manchester United	http://www.manutd.com/home/default.sps
D	Supermarket	Aldi	http://www.aldi.com/
D	TV channel	Sky TV	http://www.sky.com/skycom/home/
D	University	London Art University	http://www.arts.ac.uk/

D	Fashion	Triumph	http://www.triumph.com/index.php
D	Fashion	Paul Smith	http://www.paulsmith.co.uk/

Nine adjectival image word pairs were chosen for the measurement scale in the pilot test. These nine adjectival image word pairs were chosen following an investigation of affective textile and costume museum website design using a semantic differentiation methodology (Lin and Cassidy, 2005: 3; see table 3.6).

Table 3.6 nine image words used in the website impression test

Informative-Confusing / Complicated-Simple / Interesting-Bland / Unattractive-Attractive / Vivid-Dull / Consistent-Chaotic / Traditional-Modern / Entertaining-Boring / Impressive-Plain

The website impression sheet was based on pairs of opposite words in order to indicate which sorts of websites have a higher mean value and lower standard deviation which can help to narrow down the research range. The evaluation method was statistics. Through using these emotional adjectival nouns, the sorts of test websites can be addressed after conducting the initial pilot test (I.P.T.). These nine pairs of adjectival nouns relating to the users' emotional responses have been chosen from the web usability, contents, readability, accessibility, animation, and other basic visual components.

3.3 Initial pilot test processes

Forty participants in the period from February 2006 to March 2006 conducted the initial pilot test (I.P.T.). Participants were chosen from among PhD students, MA students, and members of staff at the University of Leeds. The participants were divided into four groups, named from A to D. Each group contained eight sorts of website and ten participants attended the pilot test in each group. Fifty-three questionnaires were sent out and forty were collected.

On the questionnaire page, an open-ended question was designed to obtain the participants' opinions about the test websites. In the test process, few participants answered the open-ended question. This fact supplied some useful experience and considerations for the subsequent website impression test. Avoiding producing errors in the website design factors and stimulating the participants' opinions was very important during the test process. The open-ended question could easily produce new findings but made it more difficult to analyze the research data. In addition, the

closed-ended questions were easier to analyze but may produce errors in the initial research assumptions, making it difficult to find new research values. Both methods are necessary in qualitative research.

3.4 The results of the initial pilot test (I.P.T.) and research findings

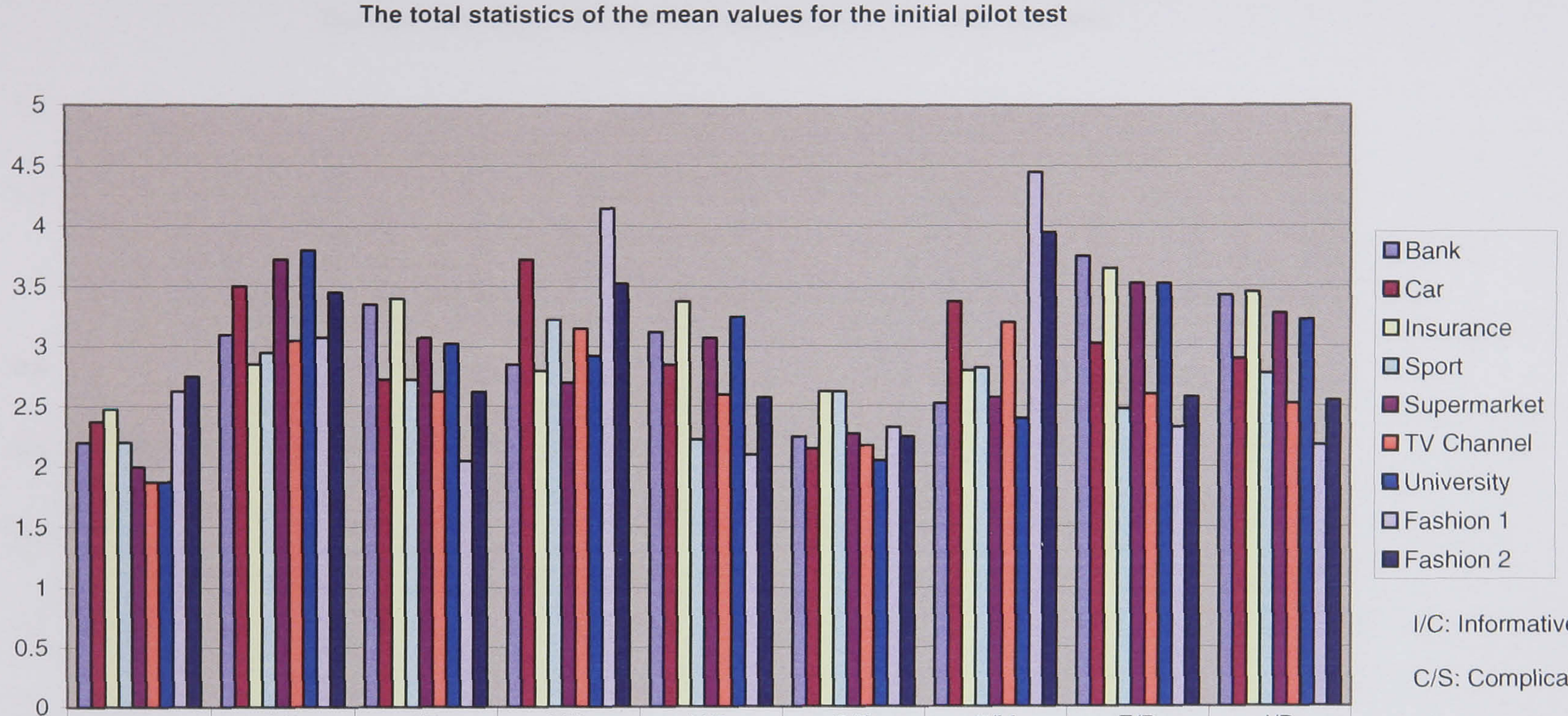
The individual test results can be seen in appendix A. Figure 3.7 shows a bar chart about the total statistics of the mean values for the initial pilot test (I.P.T.). Figure 3.8 shows a bar chart about the total statistics of the standard deviations for the initial pilot test (I.P.T.).

Insurance websites had the lowest standard deviations in the initial pilot test (I.P.T.). This result means that the participants had a high level of agreement about insurance websites. The insurance websites had lower mean values with lower standard deviations. This result shows that the participants had similar experiences with the insurance websites. During the test process, many participants felt that surfing insurance websites was very boring. This negative emotional response should be discussed in the subsequence research stage.

The fashion website had the strongest variation in terms of mean values, in relation to the other sorts of website. In addition, in the interesting-bland, entertaining-boring, and impressive-plain selections, fashion achieved higher mean values, which may mean that the participants had more interest in fashion websites than other websites. The above three pairs of adjectival nouns had a strong relevance to the website contents. The content plays an important role for the target audience. Fashion 1 had the highest mean value: 4.15 with a standard deviation: 1.027 for unattractive/attractive. Moreover, fashion 1 had the highest mean value: 2.1 with a standard deviation: 1.257 for vivid/dull. For consistent/chaotic, fashion 1 had a mean value: 2.325 and fashion 2 had a mean value: 2.575. For traditional/ modern, fashion 1 had the highest mean value: 4.45 with a lower standard deviation: 0.749 and fashion 2 had a mean value: 3.95 with a standard deviation: 1.011. Fashion websites could be used to explore the relationship between the users' positive emotions and website content. Insurance websites could be used to explore users' negative emotions. Both fashion websites and insurance websites should be further considered in the next affective study.

After conducting the pilot test analysis, fashion and insurance websites will be the next research target for the website impression test (W.I.T.) in order to explore the

users' positive and negative emotions regarding the website design field. The above considerations supplied a necessary understanding for this affective study.



	I/C	C/S	I/B	U/A	V/D	C/C	T/M	E/B	I/P
Bank	2.2	3.1	3.35	2.85	3.125	2.25	2.525	3.75	3.425
Car	2.375	3.5	2.725	3.725	2.85	2.15	3.375	3.025	2.9
Insurance	2.475	2.85	3.4	2.8	3.375	2.625	2.8	3.65	3.45
Sport	2.2	2.95	2.725	3.225	2.225	2.625	2.825	2.475	2.775
Supermarket	2	3.725	3.075	2.7	3.075	2.275	2.575	3.525	3.275
TV Channel	1.875	3.05	2.625	3.15	2.6	2.175	3.2	2.6	2.525
University	1.875	3.8	3.025	2.925	3.25	2.05	2.4	3.525	3.225
Fashion 1	2.625	3.075	2.05	4.15	2.1	2.325	4.45	2.325	2.175
Fashion 2	2.75	3.45	2.625	3.525	2.575	2.25	3.95	2.575	2.55

I/C: Informative/Confusing

C/S: Complicated/Simple

I/B: Interesting/Bland

U/A: Unattractive/Attractive

V/D: Vivid/Dull

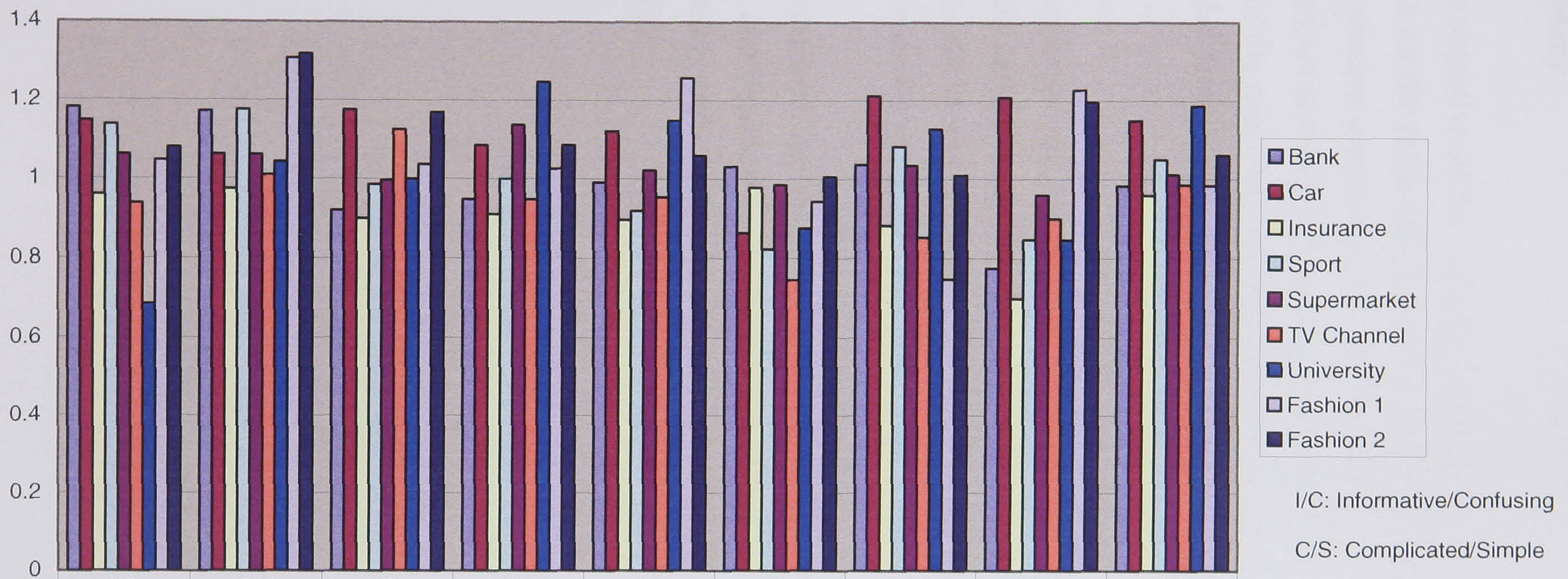
C/C: Consistent/Chaotic

T/M: Traditional/Modern

E/B: Entertaining/Boring

I/P: Impressive/Plain

Figure 3.7 the total statistics of the mean values for the initial pilot test



	I/C	C/S	I/B	U/A	V/D	C/C	T/M	E/B	I/P
Bank	1.181	1.172	0.921	0.949	0.992	1.032	1.037	0.776	0.984
Car	1.148	1.062	1.176	1.086	1.122	0.864	1.213	1.209	1.15
Insurance	0.96	0.975	0.9	0.911	0.897	0.979	0.883	0.7	0.959
Sport	1.137	1.176	0.987	1	0.92	0.824	1.083	0.847	1.05
Supermarket	1.062	1.062	0.997	1.137	1.023	0.987	1.035	0.96	1.012
TV Channel	0.939	1.011	1.125	0.949	0.955	0.747	0.853	0.9	0.987
University	0.686	1.043	1	1.248	1.149	0.876	1.128	0.847	1.187
Fashion 1	1.047	1.308	1.037	1.027	1.257	0.944	0.749	1.228	0.984
Fashion 2	1.08	1.319	1.17	1.086	1.059	1.006	1.011	1.196	1.061

I/C: Informative/Confusing

C/S: Complicated/Simple

I/B: Interesting/Bland

U/A: Unattractive/Attractive

V/D: Vivid/Dull

C/C: Consistent/Chaotic

T/M: Traditional/Modern

E/B: Entertaining/Boring

I/P: Impressive/Plain

Figure 3.8 the total statistics of the standard deviations for the initial pilot test

3.5 Summary

The main objective of the initial pilot test (I.P.T.) was to identify the sorts of websites to be used for the main affective website design study. In addition, learning from the pilot test process supplied some experience for subsequent research and tests. The considerations in designing questions and measuring participants' opinions will be helpful for the main website impression test. The results of the initial pilot test (I.P.T.) showed that fashion and insurance websites were good choices for the next research stage.

Identifying users' real emotions can help designers to avoid unsuitable designs and increase the attractive design elements in web design outcomes. There remain some difficulties about laying down simple rules to solve all problems related to this area, but it is better for designers to consider these elements than to neglect them.

Three points were improved in the website impression test website: its test time, web usability, and visual performance. This initial pilot test (I.P.T.) supplied a basic understanding and experience to explore further emotional design in the website design field.

Chapter 4 Methodology

4.1 Introduction

Through conducting the literature review and the initial pilot test (I.P.T.) which aimed to narrow down the research range, the perspectives of the website impression test (W.I.T.) is proposed in this chapter in order to supply the theoretical strategy for the future affective study. This research aimed to examine the value of emotional design in the website design field in order to explore the role of emotional design, create a website design reference model, and develop a measured method for detecting users' preferences. This chapter consists of the overall approach taken and the rationale, the proposed research methods, the proposed evaluation methods, the plan for the website impression test (W.I.T.), website choice and design processes for constructing a website impression test site, and website impression test process. Through comparing the discussed process of the theoretical methods, the basic strategy can be decided in this study. The process methods involved Think-Aloud usability testing, Emotional Probes testing (EPs testing), and questionnaires. In addition, the proposed evaluations method covers a coding system and statistics. Triangulation was used in making consistent the process methods and evaluation methods. The aim is to follow the methods of qualitative research and identify this study subjectively. Some limitations of the chosen methods, the development of constructing the test websites, and the test process will be discussed in this chapter.

4.2 The overall approach taken and the rationale

The considerations and perspectives for the methodology were based on a paradigm of choices in the proposed process and evaluation methods, especially in Think-Aloud usability testing and Emotional Probes testing. To consider situational responsiveness, some research methods in the undertaken processes were improved in order to acquire methodological appropriateness. This orientation decided the research strategy. It belongs to the discovery-orientated methodology. Patton (1990: 39 and 42) introduced this concept in qualitative evaluation and research methods. Quantitative research may not be totally satisfactory if the previous assumptions caused errors at the initial research stage. If so, the research will easily go in the wrong direction. The value of qualitative research is to follow the orientation of the research process; the research strategy can be changed by the research process findings in order to achieve better results. In other words, there is no singular research method in the qualitative research field. Although qualitative research can obtain more research findings than

quantitative research, qualitative research sometimes needs quantitative data in order to clarify the research results. In the initial pilot test process, the importance of the quantitative data appeared in the test process and test results. An open-ended question was designed in the initial pilot test questionnaire; few participants answered this question. This situation may influence the test results because each design factor could not be measured correctly in the test process. In addition, the statistics of the test results does not mean that the research aims have been measured correctly. More than one classification for website design factors could be used in the test website. As mentioned previously in the literature review, much evidence showed that high quality contents, regular updating, minimized loading, and ease of use constituted the four main design points in the website design field. Following the development of dynamic website design, the importance of animation is becoming dramatically more important than before. If emotional design is important in the website design field, which strategy can supply better solutions to predict users' impressions? This point should be carefully considered at the initial research stage. Moreover, participant choice and test website choice were also important in this study.

Usability, accessibility, and user experience constitute the current website design field. Users' emotional responses may result from the above design fields. In addition, it may be considered in the web content. If we are concerned about the content, the importance of the content factor will not only rely on the efforts of the website design team. The web content has great relevance to professional knowledge and understanding. The improvements for web content will need in-depth exploration. This consideration will depart further from the design field. The literature review involved graphic design, website design, and emotional design, to explore possible design factors which may influence the participants' emotions in the website observation process. This perspective was concerned with the discovery-orientated methodology that also caused the classifications of the design factors to be changed in the website impression test (W.I.T.) and the improved website impression test (I.W.I.T.). Participants' protocol data played a very important role in this study.

The closed-ended and open-ended research methods have their own particular advantages and disadvantages in the inquiry. Normally, the open-ended research methods can supply more research findings but these are difficult to analyze. The closed-ended research methods are easy to analyze but it may be difficult to cover all phenomena. Think-Aloud usability testing and Emotional Probes testing in creating the mood board belong to open-ended research methods. In addition, the supplemental short questionnaire about the Emotional Probes testing and the questionnaires can be

sorted into closed-ended research methods, to use Think-Aloud usability testing and Emotional Probes testing based on searching for new findings from the participants. In addition, using the supplemental short questionnaire in EPs testing and the questionnaires is designed to consider whether the face validity can explain the credibility. Conducting the website impression test (W.I.T.), produced several findings about web design factors from the results of the participants' protocol data and the results of the questionnaires. Both qualitative and quantitative data are necessary in this research field. Visual and verbal components were widely used in the design evaluation. Think-Aloud usability testing belongs to the verbal method. The visual method involves Emotional Probes testing and questionnaires.

The initial pilot test strategy was used for exploring the development of the website impression test (W.I.T.) and narrowing down the research focus. Another small-scale pilot test-the second pilot test (S.P.T.) was also used to examine the test website and the test processes before conducting the main website impression test. Full discussions about the pilot tests are presented in chapters three and four. Through conducting the pilot tests, the test website and test methods were fully developed. Moreover, the test time was limited to an acceptable range in order to minimize the research errors.

The five key research questions are shown below in table 4.1.

Table 4.1 key research questions

Key Research Questions:

1. What is emotional design in terms of website design?
2. What is the impact of emotional design on website design?
3. What are the key problems facing users in terms of website design?
4. Which methods are currently used in website design?
5. How can we evaluate emotional design in website design and use the results to enhance the quality of websites?

Regarding question five above, users' emotions are very difficult to measure through using one or two methods because every method has its own disadvantages. For Think-Aloud usability testing, the participants may refuse to present their opinions about some design factors in the test process but this method can help researchers to find more research findings. In the initial pilot test process, this situation appeared several times where the participants did not present any opinions. If the results of the

participants' protocol data and the results of the questionnaires are compared, the difference for each design factor can be observed easily. For the Emotional Probes testing, the results remain an area for discussion in terms of how to judge design style from the participants' produced boards. The decision will be based on the performance of colour and the performance of interface. The performance of interface involves lines, shapes, texture, fonts, and texts. To compare the test website and the board, the performance of design style can be measured in this way. Considering the questionnaire testing, this method needs to set questions that are as correct as possible at the initial research stage. Although the methods employed have some limitations and disadvantages, each method still had its own advantages in conducting this research.

4.3 Research methods

The process methods involved Think-Aloud usability testing, Emotional Probes testing (EPs testing), and questionnaires. The method choice and discussions are presented below separately.

4.3.1 Think-Aloud usability testing

Nielsen (1993: 195) stated that: 'This technique may be the single most valuable usability engineering method'. The aim here is to establish how the user thinks about the task and where the user encounters problems when using the system. Through the cognitive process, the user's emotion about using websites can be identified.

> Newell, Shaw, and Simon (1958) intended to discover and understand the details of what information people visit, how people represent that information, how people bring prior knowledge to bear, and what transformations people make to information in the course of solving some puzzle or performing some task. One method of understanding these details of thought that has been in use for 40 years is think-aloud protocol analysis (Ericsson and Simon, 1993).

During the test process, its limitations depend on the user's skill and experience. The participants may be influenced by unfamiliar skills during the test process, and the results could lose their significance. Some of the Think-Aloud method guidelines were adopted during this study. Furthermore, the range of target audiences and protocol data played an important role in this research. Protocol data codes were decided after conducting the website impression test (W.I.T.). In the initial pilot test

(I.P.T.) and the second pilot test (S.P.T.) for the website impression test, the participants usually were embarrassed to present their opinions at the early test stage. Sometimes participants felt puzzled about the terminology used or how to observe the design problems efficiently. This influence could have cost test time and even influence the correction rate. After conducting several tests, this method was changed into a negotiated method in order to stimulate participants to make more observations during the test process. Since the researchers cannot influence the participants' decisions, these simple negotiated questions were only limited to some terminology explanations or when asking the participants about their feelings related to some design factors. In the test process, this rule was followed for every test. Table 4.2 shows the Think-Aloud protocol guidelines for user evaluations of the website impression test (W.I.T.).

Table 4.2 Think-Aloud protocol guidelines for user evaluations

Adapted from "Methods for successful 'Thinking-Out-Loud' procedures" developed by Judy Ramey, University of Washington, with additions by Usability Analysis & Design, Xerox Corporation (Pieratti, 1995).

In General:

1. When you are screening the participants for a study, notice how they respond to your questions. Decide on a strategy for engaging the participant before they arrive for the user evaluation.
2. Be careful of the social dynamics you set up with the participant
3. Don't bias the participant
4. Avoid interactions with the user that can shift the focus from the user's domain to the writer's
5. Don't let yourself get impatient!
6. Learn to probe in a neutral way to get information on which to base your written improvements

Although Think-Aloud instruction rarely works well and this method is unnatural for users and participants, it costs less when doing usability testing and is very close to approaching individual usage. Genise's Think-Aloud usability testing advantages and disadvantages are shown below in table 4.3 (Genise, 2002).

Table 4.3 the advantages and disadvantages of Think-Aloud usability testing (Genise, 2002)

The Advantages and Disadvantages of Think-Aloud usability testing	
Advantages	Disadvantages
Less expensive	The environment is not natural to the user
Results are close to what is experienced by users	

To consider the above advantage and to get research findings from the second pilot test (S.P.T.), this method was changed to a negotiated method to carry out the website impression test (W.I.T.) and the improved website impression test (I.W.I.T.).

A web survey is also a good method for collecting the users' opinions in order to explore this topic. Web designers cannot easily create a new website through this method to carry out their design processes due to limitations of budget and time. It also has problems to do with some design factors or situations that cannot be considered properly before starting the research. In addition, to explore intensive design problems, this method cannot efficiently explain all of the phenomena.

Think-Aloud usability testing is a convenient and efficient way to explore and gain qualitative users' feedback. Through using the following three phases, user's insightful emotions can be identified by Think-Aloud usability testing to search for an appropriate model in order to create more possibilities in the design process and avoid making unsuitable decisions that cause inconvenience and negative emotional responses in web outcomes. Table 4.4 shows the phases of Think-Aloud usability testing.

Table 4.4 the phases of Think-Aloud usability testing

Phase 1: Collecting Think-Aloud Data
Phase 2: Data Analysis
Phase 3: Making a Reference Model from Data Analysis and Research Findings

4.3.2 Emotional Probes testing (EPs testing)

Emotional Probes testing (EPs testing) used mood board production to detect users' emotional response from websites and can supply further understanding for designers to identify the users' impressions. This was used to define basic visual factors and

their influences for users. Through performing basic analyses, this method can reveal the relationships between the users' impressions and the visual performance of the websites. Through comparing the participants' production of images, the statistics from the questionnaires and the real visual performance, the web styles of the test websites can be established. The performance of design style was judged by the performance of the colour and the performance of the interface, which involves lines, shapes, texture, fonts, and texts.

The choice of this method was based on 2005 idc conference papers concerned with emotional design. Through conducting a comprehensive review of research methods concerned with emotional design, this method supplied a way to explore the relationship between the participants' impressions and visual design factors. In the 2005 idc conference paper, 'Designing Emotional Probes for Usability Evaluation' , mood boards were used to explore the participants' emotional responses in usability testing (Chang and Press, 2005: B6-1).

> The cultural probes were successful for us in trying to familiarize ourselves with the sites in a way that would be appropriate for our approach... They provided us with a rich and varied set of materials that both inspired our designs and let us ground them in the detailed texture of the local cultures (Graver, 2001).

A website can be called a sort of international product. The fact is that different language websites also contain different cultures. This difference definitely influences accessibility. This sort of difference should be limited to an acceptable level in order to get a better deign outcome. Emotional Probes testing can supply more detailed information about visual factors which cannot be taken from questionnaires or Think-Aloud usability testing. The above two reasons convinced the author to use Emotional Probes testing in the website impression test.

Although many visual performances can be judged or decided by the designers' experiences, these experiences make it difficult to involve real users' impressions. It is necessary to determine a method for detecting users' impressions about website visual performances.

To avoid causing some errors in the test results or making some design factors difficult to present on the mood board, a supplemental short questionnaire of Emotional Probes testing was designed in the website impression test site in order to

obviate these disadvantages. For example, participants will find it difficult to draw fonts or texts on the board, so this questionnaire will help them to carry out this part in the test process. Table 4.5 shows the supplementary short questionnaire used in the Emotional Probes testing for the website impression test (W.I.T.). In addition, table 4.6 shows the three supplementary questions used in the short questionnaire of Emotional Probes testing for the improved website impression test (I.W.I.T.). The sizes of the text, the animation, and sound were added into this questionnaire.

Table 4.5 the supplemental short questionnaire of Emotional Probes testing for the website impression test

Colours:
☐C1 ☐C2 ☐C3 ☐C4 ☐C5 ☐C6 ☐C7 ☐C8 ☐C9 ☐C10
C1: Black, C2: White, C3: Gray, C4: Blue, C5: Violet, C6: Yellow, C7: Red, C8: Orange, C9: Green, C10: Brown

Lines:
☐L1 ☐L2 ☐L3 ☐L4 ☐L5 ☐L6 ☐L7 ☐L8 ☐L9 ☐L10
L1: Horizontal line, L2: Vertical line, L3: Diagonal line, L4: Angular line, L5: Jagged line, L6: Thinning and thickening line, L7: Curved line, L8: Undulating line, L9: Random line, L10: Grid line

Shapes:
☐S1 ☐S2 ☐S3 ☐S4
S1: Triangle, S2: Square, S3: Circle, S4: Trapezoid

Texture:
☐T1 ☐T2 ☐T3 ☐T4 ☐T5 ☐T6
T1: Plain structures, T2: Rough structures, T3: Soft structures, T4: Hard structures, T5: Tangible structures, T6: Intangible structures

Fonts:
☐F1 ☐F2 ☐F3 ☐F4 ☐F5 ☐F6 ☐F7
F1: Arial, F2: Times, F3: Courier New, F4: Georgia, F5: Verdana, F6: Geneva, F7: Others

Texts:
☐TE1 ☐TE2 ☐TE3 ☐TE4 ☐TE5 ☐TE6
TE1: Italicized text, TE2: Boldface text, TE3: Underlined text, TE4: Coloured text, TE5: Capital letters, TE6: Plain text

Table 4.6 the three additional questions used in the supplemental short questionnaire of Emotional Probes testing for the improved website impression test

The sizes of texts:
☐ST1 ☐ST2 ☐ST3 ☐ST4 ☐ST5 ☐ST6 ☐ST7 ☐ST8 ☐ST9
ST1: 12, ST2: 13, ST3: 14, ST4: 15, ST5: 16, ST6: 17, ST7: 18, ST8: 19, ST9: 20

Animation:

☐A1 ☐A2 ☐A3 ☐A4 ☐A5
A1: Very exciting, A2: Exciting, A3: Average, A4: Unexciting, A5: Very unexciting

Sound:
☐SO1 ☐SO2 ☐SO3 ☐SO4 ☐SO5
SO1: Very good, SO2: Good, SO3: Average, SO4: Bad, SO5: Very bad

After conducting the website impression test (W.I.T.), the research findings and test results helped this improved questionnaire to be used in the improved test (I.W.I.T.). This consideration and decision were based on the propriety of the participants' opinions. The importance of design factors was determined by conducting a data analysis. In the website impression test process, the participants had different opinions about the website design factors. The statistics of the participants' protocol data explained the performance of design factors for the test websites.

4.3.3 Questionnaires

Some negative or positive users' emotional responses resulted from web usability but others were caused by other design elements. Using basic questionnaires, concern with basic web usability, can help researchers to explore additional design problems. Moreover, questionnaires will help to examine the results of the participants' protocol data in this study. This method was also used in the initial pilot test (I.P.T.).

By calculating the mean values and standard deviations, the results of the questionnaires can improve the disadvantages of Think-Aloud usability testing. Qualitative research sometimes needs to be supported by quantitative data.

Table 4.7 shows the main questionnaire for the website impression test (W.I.T.). In addition, table 4.8 shows the main questionnaire for the improved website impression test (I.W.I.T.). The main questionnaire for the improved website impression test (I.W.I.T.) was decided after conducting the data analysis of the website impression test (W.I.T.). The performance of the design factors had been decided through comparing the participants' opinions. This improvement helped the results of the improved website impression test (I.W.I.T.) in the same design factor selection.

Table 4.7 the main questionnaire for the website impression test

Quality of content:
Unexciting ☐1 ☐2 ☐3 ☐4 ☐5 Exciting
Low ☐1 ☐2 ☐3 ☐4 ☐5 High

Loading time:
Unsatisfied ☐1 ☐2 ☐3 ☐4 ☐5 Satisfied

Navigation:
Difficult ☐1 ☐2 ☐3 ☐4 ☐5 Easy
Links:
Inefficient ☐1 ☐2 ☐3 ☐4 ☐5 Efficient
Interface:
Difficult ☐1 ☐2 ☐3 ☐4 ☐5 Easy
Animation (if applicable):
Unattractive ☐1 ☐2 ☐3 ☐4 ☐5 Attractive
Consistence:
Dissimilar ☐1 ☐2 ☐3 ☐4 ☐5 Similar
Use of colour:
Bad ☐1 ☐2 ☐3 ☐4 ☐5 Good
Use of layout:
Bad ☐1 ☐2 ☐3 ☐4 ☐5 Good
Information presentation:
Confused ☐1 ☐2 ☐3 ☐4 ☐5 Clear

Table 4.8 the main questionnaire for the improved website impression test

Navigation:
Difficult ☐1 ☐2 ☐3 ☐4 ☐5 Easy
Loading time:
Unsatisfied ☐1 ☐2 ☐3 ☐4 ☐5 Satisfied
Links:
Inefficient ☐1 ☐2 ☐3 ☐4 ☐5 Efficient
Interface:
Difficult ☐1 ☐2 ☐3 ☐4 ☐5 Easy
Sound:
Bad ☐1 ☐2 ☐3 ☐4 ☐5 Good
Animation:
Unattractive ☐1 ☐2 ☐3 ☐4 ☐5 Attractive
Emotion:
Negative ☐1 ☐2 ☐3 ☐4 ☐5 Positive
Colour:
Bad ☐1 ☐2 ☐3 ☐4 ☐5 Good
Readability:
Unclear ☐1 ☐2 ☐3 ☐4 ☐5 Clear
Content:
Bad ☐1 ☐2 ☐3 ☐4 ☐5 Good

The aim was to combine protocol codes in order to analyze them efficiently. Although Think-Aloud usability testing has a disadvantage in terms of its unnatural (to the participant) characteristics, this method still supplied a great number of advantages to help this study; for example, to decide the proportion of design factors and to supply triangulation with Emotional Probes testing and questionnaires.

4.4 Evaluation methods

The evaluation methods were: a coding system and statistics. The considerations about the proposed evaluation methods will be shown below separately.

> Patton (1990: 184) stated that there is no clear rule about the scale of the sampling in qualitative evaluation and research methods. The considerations depend on the aims of the research, its possibilities, time considerations, and the dangerous areas of the research.

Denzin (1978) stated that an important method is to use triangulation to improve the chances of closing the loop. In 1978, Denzin classified triangulation into four types. These are data triangulation, investigator triangulation, theory triangulation, and methodological triangulation. This study used data triangulation, theory triangulation, and methodological triangulation.

The aim of this research was to produce a website design reference model. It was considered best to choose Theory-based and operational construct sampling for the choice of websites and the choice of participants.

4.4.1 A coding system

Grounded theory is based on qualitative research. B. G. Classer and A. C. Strauss developed this method in 1967. To date, this method had been widely used in doing qualitative research. The coding can be classified into open coding, axial coding, and selective coding. Selective coding was used to analyze the participants' protocol data in this study. After conducting the whole test process, the importance of the codes was decided from the test observations and participants' opinions. The main consideration was to follow the principle of naturalistic research. 'Qualitative research is naturalistic' (Patton, 1990: 41).

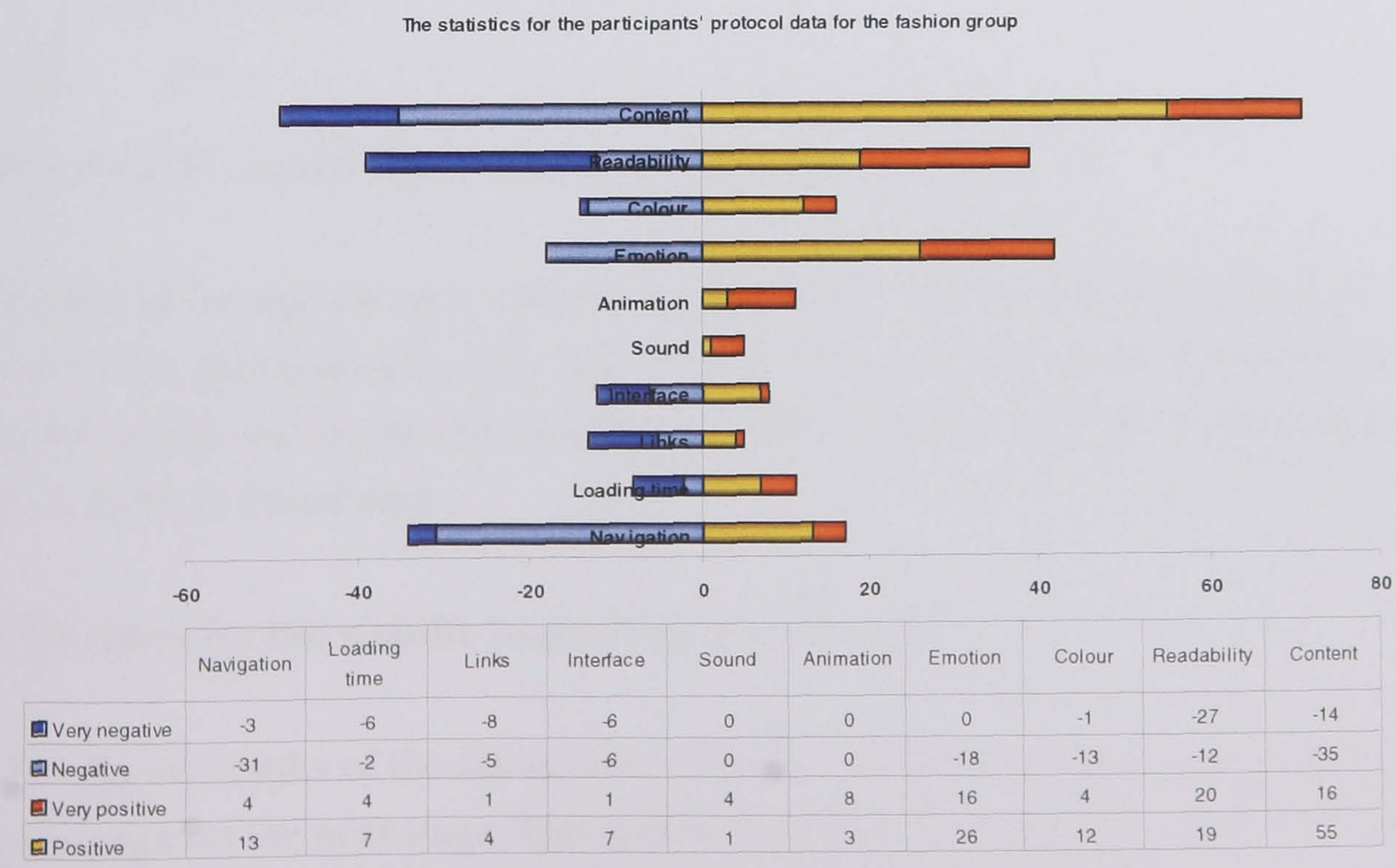
For the Think-Aloud test, codes were assigned for ten factors (navigation, loading time, links, interface, sound, animation, emotion, colour, readability, content), plus a code used for any personal comments. This consideration covers the users' purity of emotional responses to the website impressions and the emotional responses to the web usability. From navigation to personal comments, each factor was be given a code. Each factor was assigned four levels, these are xx, x, y, and yy at the bottom

right. x means positive and y means negative. In addition, double x or double y means very positive or very negative. The codes are shown below in table 4.9. These codes were decided from the classification of the questionnaire and improved by conducting the test. By using a coding system, each factor and its influences can be discussed in order to establish the foci for the website reference model.

Table 4.9 codes for the participants' protocol data

Factors	Codes			
Navigation	**A**xx	**A**x	**A**y	**A**yy
Loading time	**B**xx	**B**x	**B**y	**B**yy
Links	**C**xx	**C**x	**C**y	**C**yy
Interface	**D**xx	**D**x	**D**y	**D**yy
Sound	**E**xx	**E**x	**E**y	**E**yy
Animation	**F**xx	**F**x	**F**y	**F**yy
Emotion	**G**xx	**G**x	**G**y	**G**yy
Colour	**H**xx	**H**x	**H**y	**H**yy
Readability	**I**xx	**I**x	**I**y	**I**yy
Content	**J**xx	**J**x	**J**y	**J**yy
Personal comment	**K**			

The performance- a sample for the statistics of the participants' protocol data can be seen in figure 4.10.



	Navigation	Loading time	Links	Interface	Sound	Animation	Emotion	Colour	Readability	Content
Very negative	-3	-6	-8	-6	0	0	0	-1	-27	-14
Negative	-31	-2	-5	-6	0	0	-18	-13	-12	-35
Very positive	4	4	1	1	4	8	16	4	20	16
Positive	13	7	4	7	1	3	26	12	19	55

Figure 4.10 a sample of the statistics of the participants' protocol data

4.4.2 Statistics

In the questionnaire section, through calculating the SD (Standard Deviations) and MV (Mean Values), the participants' opinions about the design factors of the web questionnaire can be discussed and compared. This method was also used in the initial pilot test (I.P.T.) in order to discover what kinds of websites equip the research value. The standard deviation measures the spread of the data for the mean value. This method is useful in comparing a great amount of data which may have the same mean but a different range. Through comparing the results of the individual factors, researchers can find the performance of the design factors in order to decide which test website can provide better performances in terms of these. Figure 4.11 shows the mean value formula. In addition, figure 4.12 shows the standard deviation formula.

$$\bar{X} = \frac{\Sigma X}{n}$$

Figure 4.11 the mean value formula

$$\sigma = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

Figure 4.12 the standard deviation formula

The order of the website performance for each factor will be decided through the results of the questionnaires. The main reason is that the participants answered every question in this section but did not present opinions that covered all of the design factors in the protocol data.

4.5 The plan for the website impression test (W.I.T.)

Following the results of the initial pilot test (I.P.T.), insurance and fashion websites were chosen for the next stage. This section supplies basic guidelines about the choice of websites and the choice of participants.

4.5.1 The choice of websites

The choice of websites is classified into two groups. Group A was fashion websites and Group B consisted of insurance websites. Each group contained ten websites for the participants which was changed to five websites in each group after conducting the second pilot test (S.P.T.). The main reason for this was to reduce the average test time from two hours to one. Table 4.13 shows a list of 20 website samples and figure 4.14 presents images from these 20 website samples.

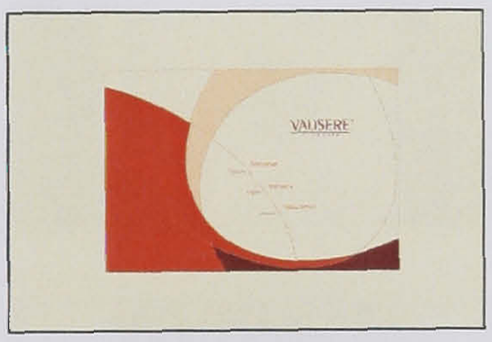
Table 4.13 list of 20 chosen website samples

All of the test websites were downloaded in the period from 1st April 2006 to 15th April 2006.

Website Samples			
Codes	Sort of Website	Name of Website	Website Addresses
A1	Fashion	Diesel	http://www.diesel.com/site.html
A2	Fashion	Valisere	http://www.valisere.com/
A3	Fashion	Guess	http://www.guess.com/
A4	Fashion	Triumph	http://www.triumph.com/index.php
A5	Fashion	Paul Smith	http://www.paulsmith.co.uk/
A6	Fashion	Zara	http://www.zara.com/v06/index.html
A7	Fashion	H & M	http://www.hm.com/
A8	Fashion	Fcuk	http://www.frenchconnection.com/home_06ss.html
A9	Fashion	Ted Baker	http://www.tedbaker.co.uk/
A10	Fashion	Harvey Nichols	http://www.harveynichols.com/output/Page1.asp

B1	Insurance	Ing	http://home.ingdirect.com/
B2	Insurance	Zurich	http://www.zurich.co.uk/home/Welcome/Introduction.htm
B3	Insurance	Churchill	http://www.churchill.com/
B4	Insurance	Lady in sure	http://www.ladyinsure.co.uk/?ReferrerCode=IAVF
B5	Insurance	Non-standard	http://www.non-standard-car-insurance.co.uk/
B6	Insurance	All insurance company	http://www.all-insurance-uk.com/
B7	Insurance	Sta Travel	http://www.statravel.co.uk/cps/rde/xchg/uk_division_web_live/hs.xsl/insurance.htm
B8	Insurance	Travel with insurance	http://www.travelwithinsurance.com/index.html
B9	Insurance	Cheap-uk-travel-insurance.	http://www.cheap-uk-travel-insurance.co.uk/
B10	Insurance	Bupa	http://www.bupa.co.uk/promotionscc5740/

A1



A2

A3

A4

A5

A6

A7

A8

A9

A10

B1

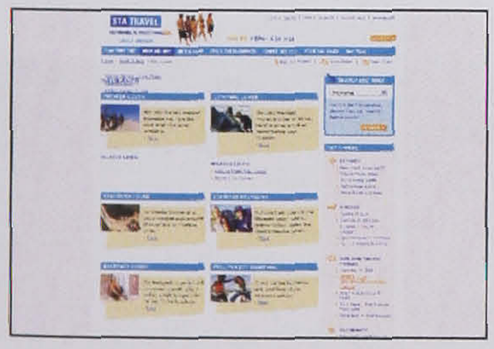
B2

B3

B4

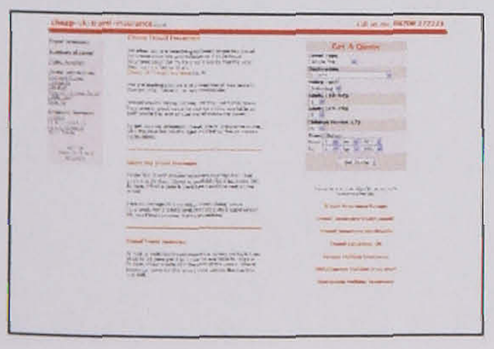
B5

B6



B7

B8



B9

B10

Figure 4.14 images from the 20 chosen website samples

The website samples were chosen from UK based websites, Taschen's 1000 favorite

websites (Wideman, 2002), and websites 100% loaded (Lindner, 2004). Furthermore, insurance websites were chosen from the recommendations of All Insurance UK Companies online.

4.5.2 The choice of participants

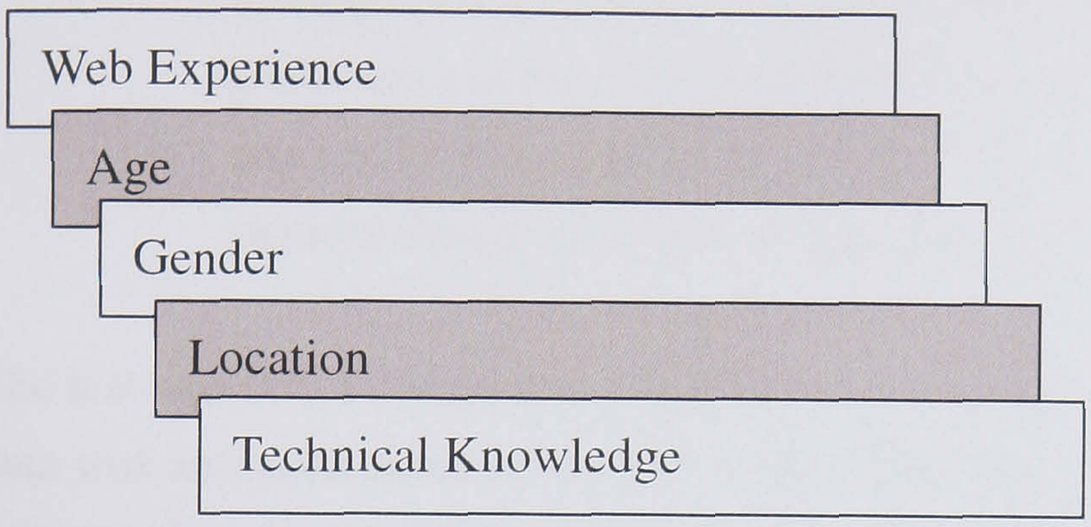


Figure 4.15 the essential information required about web users (from Itzkovitch and Till, 2003: 15, 17, 19, 25, 27)

From figure 4.15 above, five components were considered when choosing the participants for the website impression test (W.I.T.). These components also influenced the choice of websites. Because the participants were chosen from the University of Leeds and previous MA students, it was necessary to choose website samples which had relevance to the location - Leeds. Table 4.16 shows the considerations employed when choosing the participants. It was necessary to limit participants to those with good web experience and technical know how in order to get reasonable test results.

Table 4.16 considerations when choosing participants

The Considerations for The Choices of Participants		
Sort of Website	Group A: Fashion	Group B: Insurance
Education	Above B.A	Above B.A
Web Experience	Experienced	Experienced
Age	20-35	20-40
Gender	Male or female	Male or female
Location	Leeds	Leeds
Technical Know How	Good level	Good level

Each group consisted of ten participants in line with the aims of this research. The target audience was chosen from experts or designers who concentrated on website design or other research fields relevant to website design in order to create better

feedback.

> Wean (2005: 13-7) pointed out that: Nielsen (2000b) introduced usability testing that adopted four to five people for testing. Over eighty percent of design problems can be solved through user testing". If the usability testing is carried out in two stages, more than 90 percent of design problems can be observed by participants because users can observe 70 percent of design problems in the first test and search out the other 20 percent design problems in the second test.

The test was thus divided into two parts, with five tests for each group and the test data was analyzed twice in order to obtain better test results. The first analysis was conducted in August 2006 and the second analysis was completed in Dec 2006.

The test analyses and evaluations were also divided into two in order to discover more design problems from the testing processes. Figure 4.17 shows the processes of the website impression test (W.I.T.).

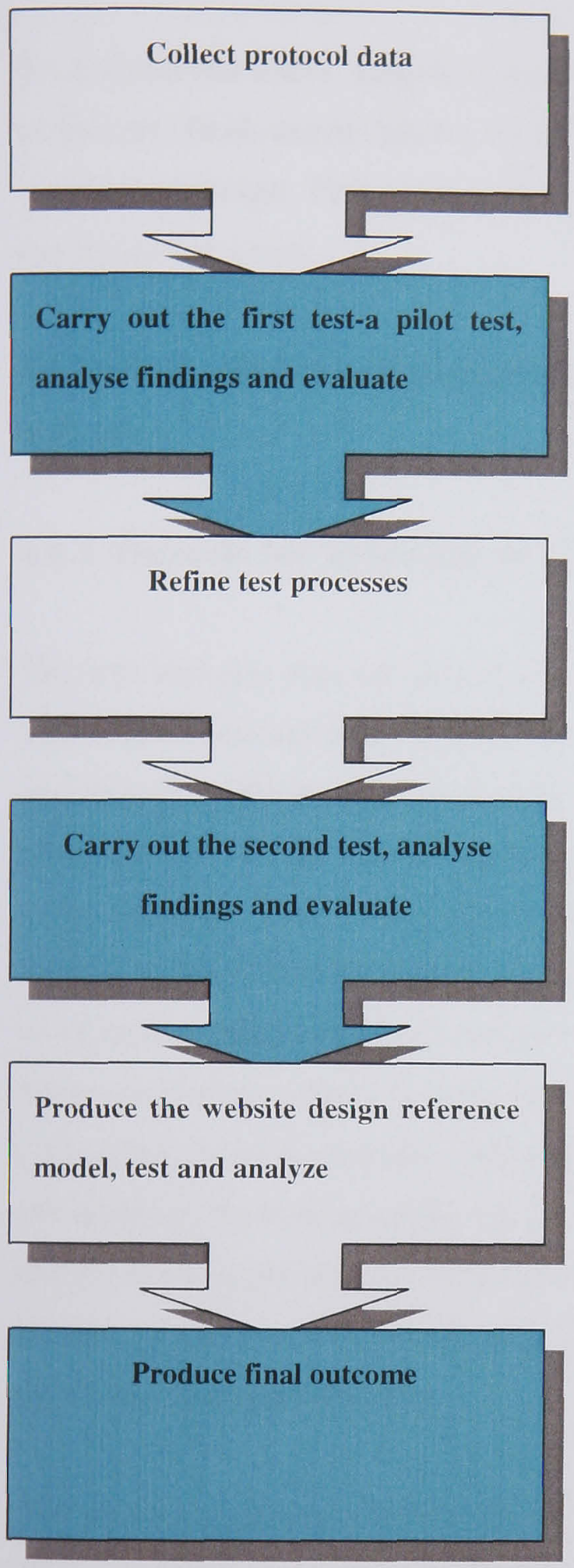


Figure 4.17 the processes of the website impression test

The main objective of Think-Aloud usability testing is to identify the roles of emotional design and its influence on affective website design study. The results of the participants' protocol data were used to decide the order of design factors after conducting the website impression test (W.I.T.). The results of the emotional probes testing supplied more details about design style and the participants' impressions of visual design factors. The results of the questionnaires helped to decide the performance of the test websites. In addition, learning from the initial pilot test process and the second pilot test process provided experience for future website impression testing.

To understand users' negative emotions can supply a better solution for design problems. Both users' likes and dislikes are important when exploring the role of emotional design. Enhancing web usability plays a key role in creating positive emotions for users.

4.6 Website choice and design processes for constructing a website impression test site

4.6.1 Methods for detecting users' emotional responses and evaluations

The test website was modified and changed several times by attending a few individual tutorials and conducting the second pilot test (S.P.T.). These considerations and changes will be discussed later in this paragraph. After completing the second pilot test (S.P.T.) for the original website impression test (W.I.T.), three main points were changed. These were the visual performance, the samples of test websites, and the test method for the Think-Aloud usability testing. Because attractive things can work better, the visual performance was changed several times in order to supply a better test environment for the participants. In addition, the observation processes for collecting the participants' opinions from the second pilot test (S.P.T.) were changed into interactive conversations to help the participants to produce more observations during the test processes. After conducting the second pilot test (S.P.T.), the first section of the test was changed to this type in order to gain more useful feedback or opinions from participants.

The website impression test (W.I.T.) consisted of three different methods for detecting the participants' emotions, which are Think Aloud usability testing, EPs testing (Emotional Probes testing), and questionnaires. The triangulation (Test Methods) are shown below in figure 4.18.

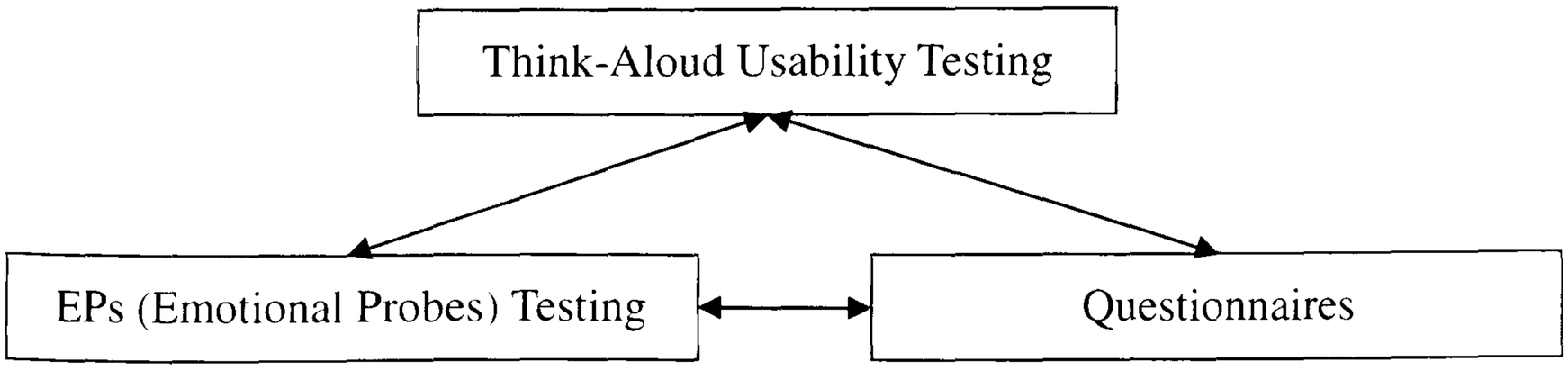


Figure 4.18 triangulation (test methods)-Think-Aloud usability testing, EPs testing, and Questionnaires

The evaluation methods will use a coding system and statistics.

4.6.2 Development of the test website and constructing processes

This website consisted of nine pages. These web pages are: the welcome page, the menu page, the fashion page, the insurance page, the about the mood board page, the creating the mood board page, the questionnaire-fashion page, the questionnaire-insurance page, and the timer page. The website test page in each group contains five websites and their individual links for the participants to make their direct observations. The observation time was limited to five minutes for each website in the test process in order to control the test time to an acceptable standard.

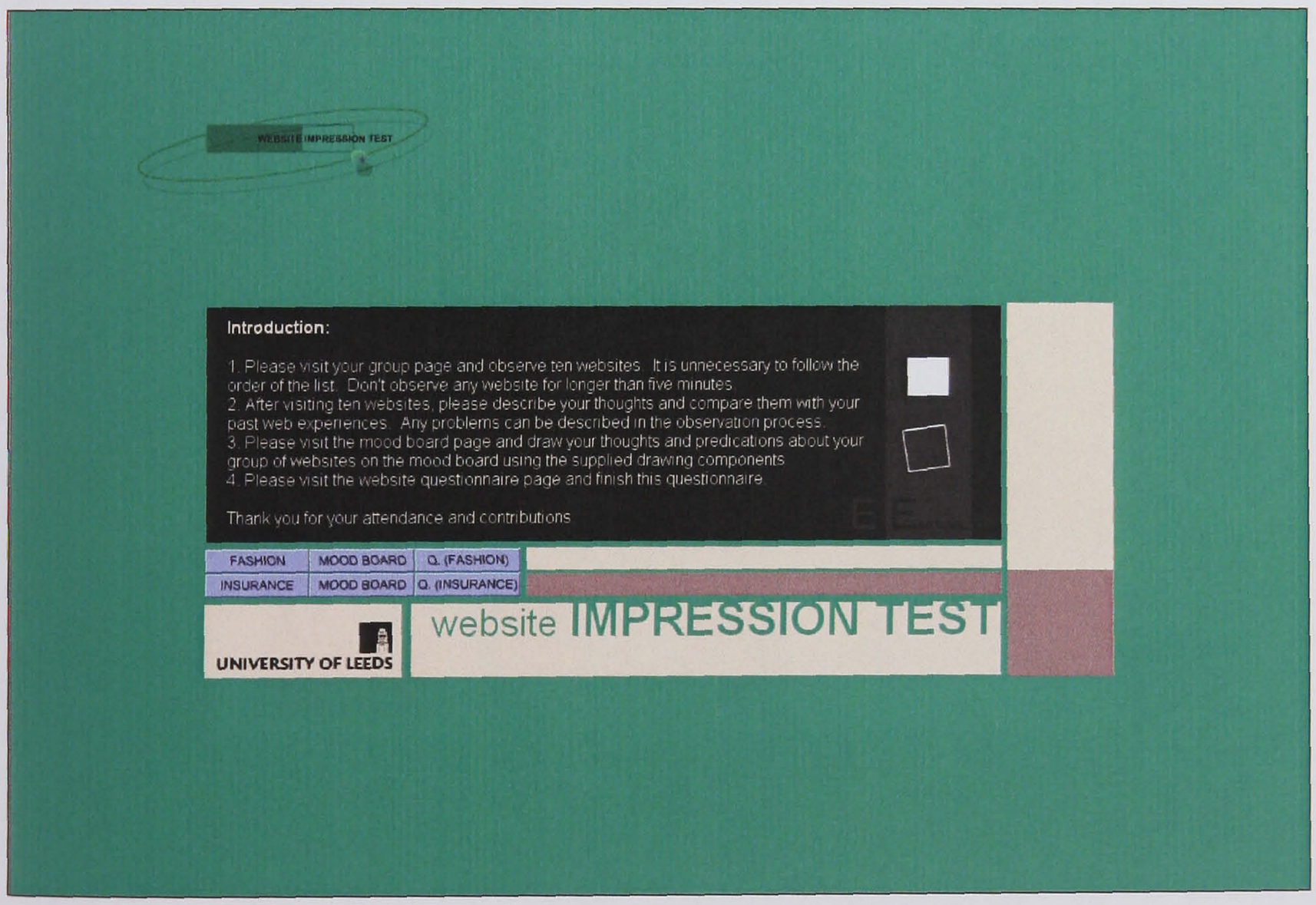
The fashion and insurance pages contained two different types of links. These links were image links and text links in order to supply previous image presentations and clear text links for the participants before observing the test websites. The about the mood board page supplied basic drawing components from colours to texts and their image explanations for doing the test. This page also contained individual internal links in order to help the participants to search for these explanations efficiently. The creating the mood board page contained a mood board tool and an online questionnaire which consisted of basic drawing components from colours to texts.

The questionnaire page in each group contained a section of the on line questionnaire in order to supply the participants with a convenient test environment. Some questions came from Wean's web usability checking lists (Wean, 2005: A2-A7) and adjectival nouns related to human emotional responses were selected in designing this questionnaire. By ticking the range from 1 to 5 for each pair of adjectival nouns, the participants can finish this questionnaire in a short period of time and print it out directly at the test place. On this questionnaire page, the print function was designed using CSS language. Some special IT design problems had to be solved in CSS and Java in this design process. Other pages were designed using Dreamweaver and Flash software. Black and highlighted warm colours and middle colours were selected for the colour scheme of this test website. Black (#000000) was chosen for its background colour. The saturated green colours, from mid green (#669900) to light green (#EAE3D3), and light gray (#FFFFCC) with orange were chosen for the main title and text colours. The consideration about choosing this colour scheme was to give participants' flash impressions for doing this test. Different level pages were designed in different types of titles in order to help the participants to make better judgments in a short time. Through designing different layouts of pages with different functions, the participants can distinguish the differences between them in a short

time. The layout was basically designed in a square and block type in order to supply direct observations and reduce the screw motions for participants. The explanations of the test were placed on the menu and every content page in order to supply explanations for the participants at the appropriate time. The size of the texts was set in larger type than on normal websites in order to supply better readability for the participants.

The classification of this test website used card sorting test. Three participants used this method to help to construct the structure of the test website. Using this method can reduce understanding errors during the test processes between the participants and the researcher(s) (Wean, 2005: 13-7).

Visual images of the website impression test site can be seen below in figures 4.19 to 4.28.



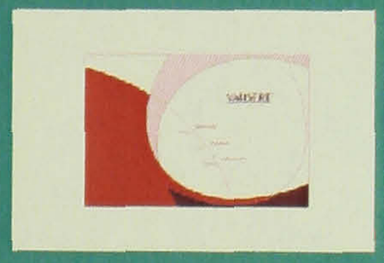
WEBSITE IMPRESSION TEST

FASHION

INSURANCE
MOOD BOARD
Q. (FASHION)
Q. (INSURANCE)
HOME
TIMER
COMMENTS

SORT OF WEBSITE	NAME OF WEBSITE
FASHION 1	Diesel
FASHION 2	Valisere
FASHION 3	Guess
FASHION 4	Triumph
FASHION 5	Paul Smith
FASHION 6	Zara
FASHION 7	H & M
FASHION 8	fcuk
FASHION 9	Ted Baker
FASHION 10	Harvey Nichols

Note:
1. It is unnecessary to follow the order of the list. Don't observe any website for longer than five minutes.
2. After visiting ten fashion websites, please describe your thoughts and compare them with your past web experiences. Any problems can be described in the observation process.



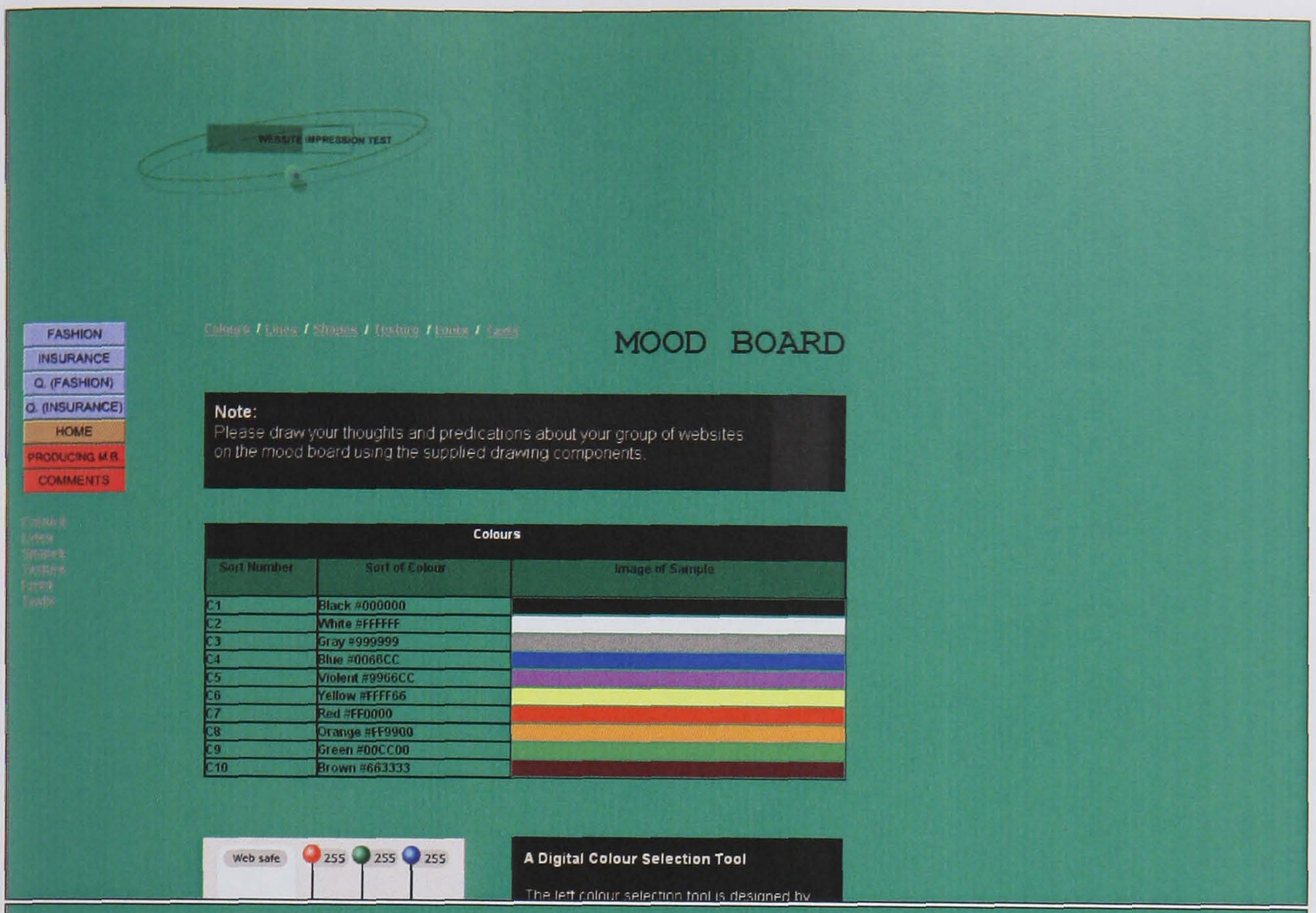
WEBSITE IMPRESSION TEST

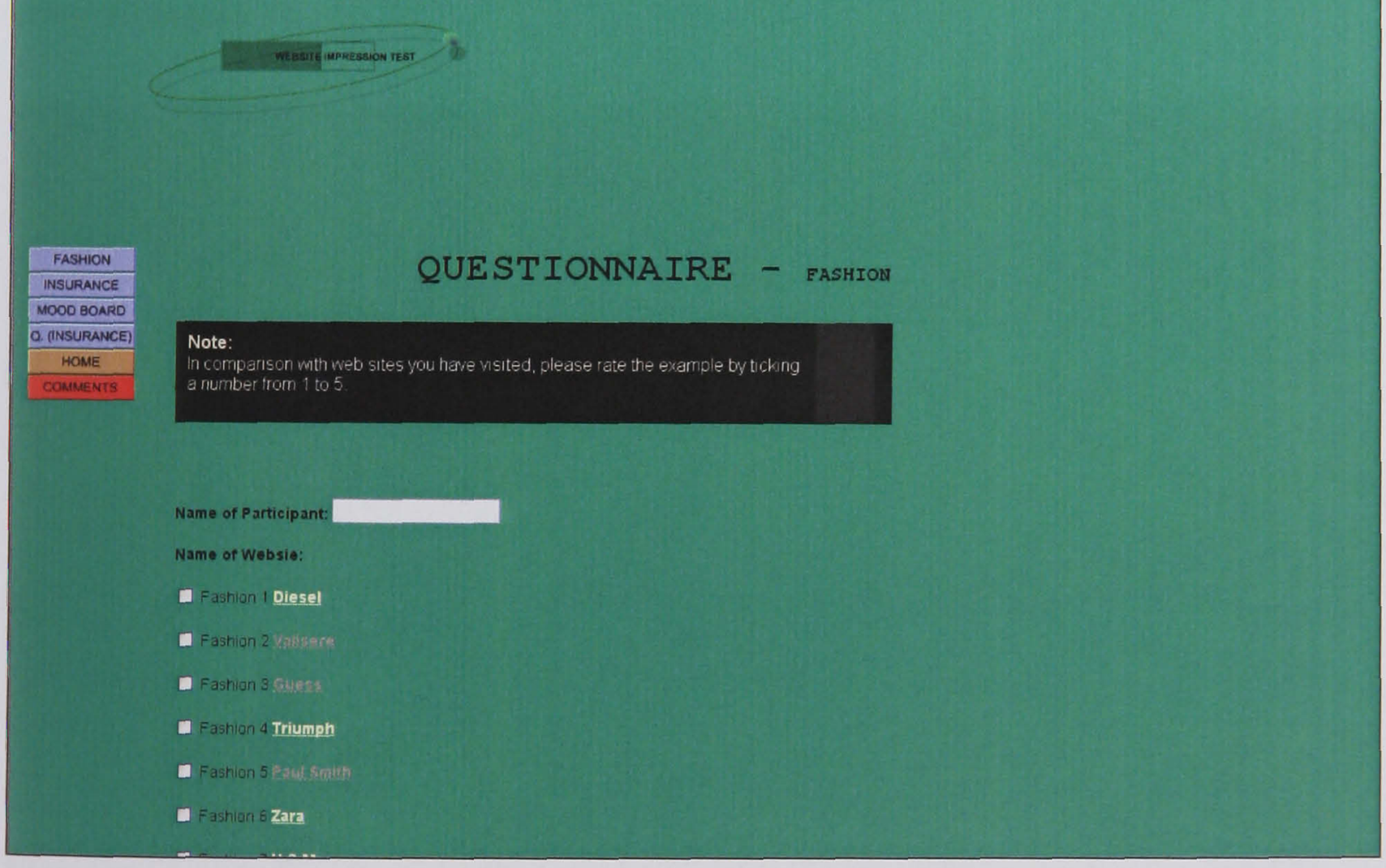
INSURANCE

FASHION
MOOD BOARD
Q. (FASHION)
Q. (INSURANCE)
HOME
TIMER
COMMENTS

SORT OF WEBSITE	NAME OF WEBSITE
INSURANCE 1	MORE THAN Direct Insurance Company
INSURANCE 2	ZURICH Insurance company in the UK
INSURANCE 3	Churchill Insurance Company
INSURANCE 4	Ladies' Ladies' Car Insurance
INSURANCE 5	Nonstandardcarinsurance company
INSURANCE 6	All insurance company
INSURANCE 7	STA TRAVEL
INSURANCE 8	travelwithinsurance.co
INSURANCE 9	cheap-uk-travel-insurance.co.
INSURANCE 10	Direct Line

Note:
1. It is unnecessary to follow the order of the list. Don't observe any website for longer than five minutes.
2. After visiting ten insurance websites, please describe your thoughts and compare them with your past web experiences. Any problems can be described in the observation process.


WEBSITE IMPRESSION TEST
FASHION
INSURANCE
Q. (FASHION)
Q. (INSURANCE)
HOME
PRODUCING M.B.
COMMENTS
Colours / Lines / Shapes / Texture / Fonts / Faces
MOOD BOARD
Note:
Please draw your thoughts and predications about your group of websites on the mood board using the supplied drawing components.
Colours
Sort Number
Sort of Colour
Image of Sample
C1 Black #000000
C2 White #FFFFFF
C3 Gray #999999
C4 Blue #0066CC
C5 Violent #9966CC
C6 Yellow #FFFF66
C7 Red #FF0000
C8 Orange #FF9900
C9 Green #00CC00
C10 Brown #663333
Web safe
255
255
255
A Digital Colour Selection Tool


WEBSITE IMPRESSION TEST
FASHION
INSURANCE
MOOD BOARD
Q. (INSURANCE)
HOME
COMMENTS
QUESTIONNAIRE - FASHION
Note:
In comparison with web sites you have visited, please rate the example by ticking a number from 1 to 5.
Name of Participant:
Name of Websie:
Fashion 1 Diesel
Fashion 2 Valisere
Fashion 3 Guess
Fashion 4 Triumph
Fashion 5 Paul Smith
Fashion 6 Zara

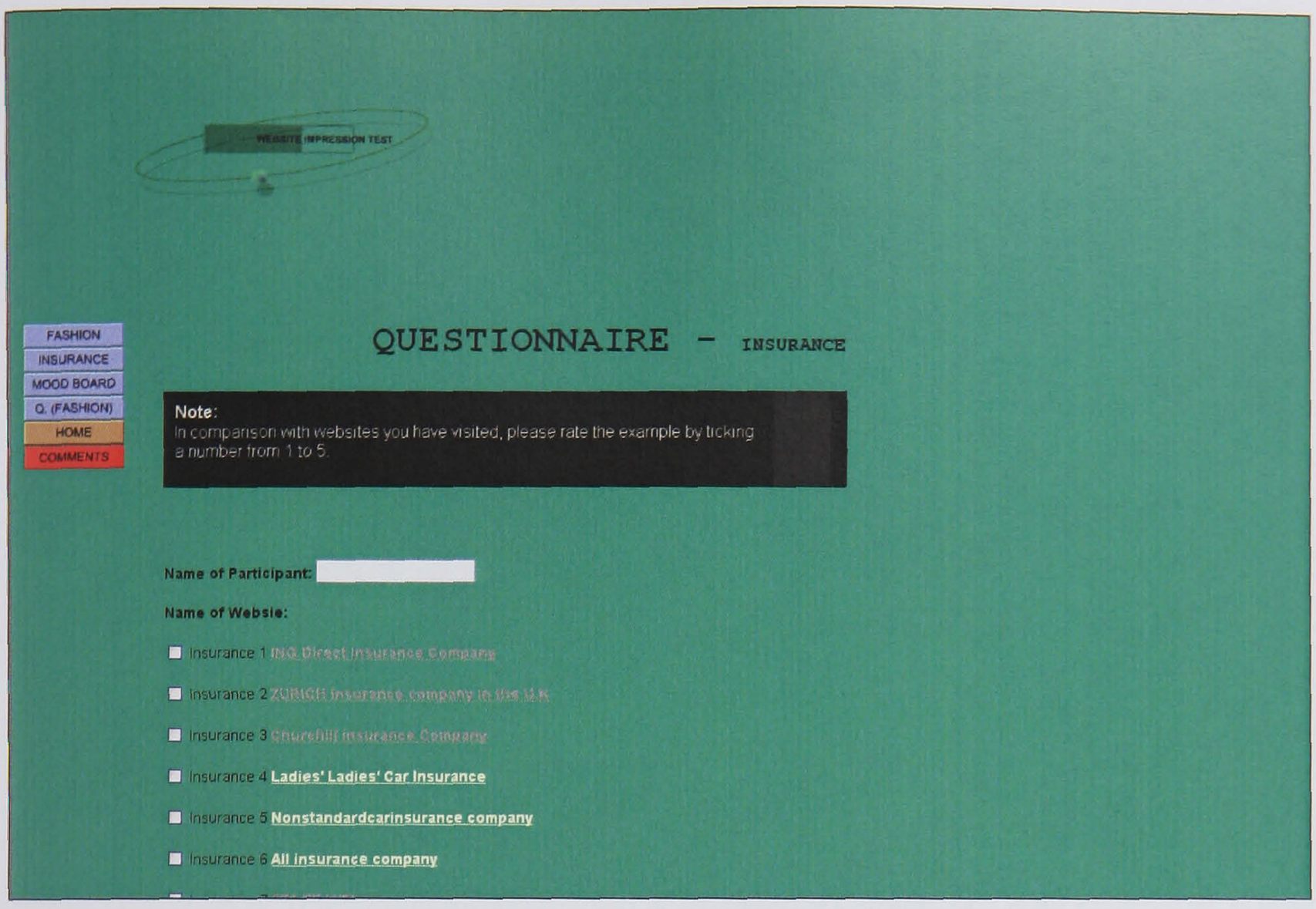


Figure 4.19 the original website impression test site (from the welcome page to its content pages)

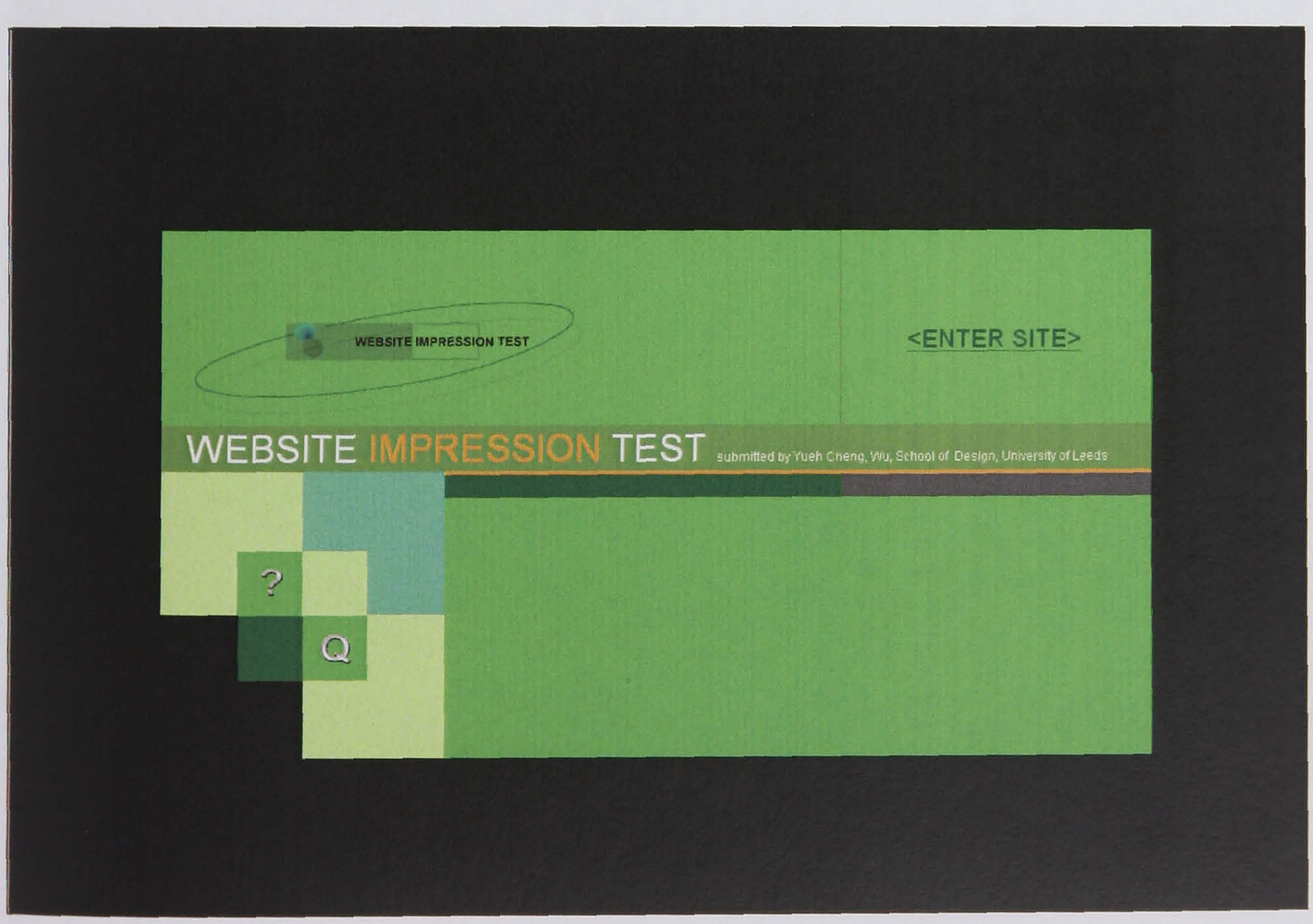


Figure 4.20 the welcome page of the website impression test site

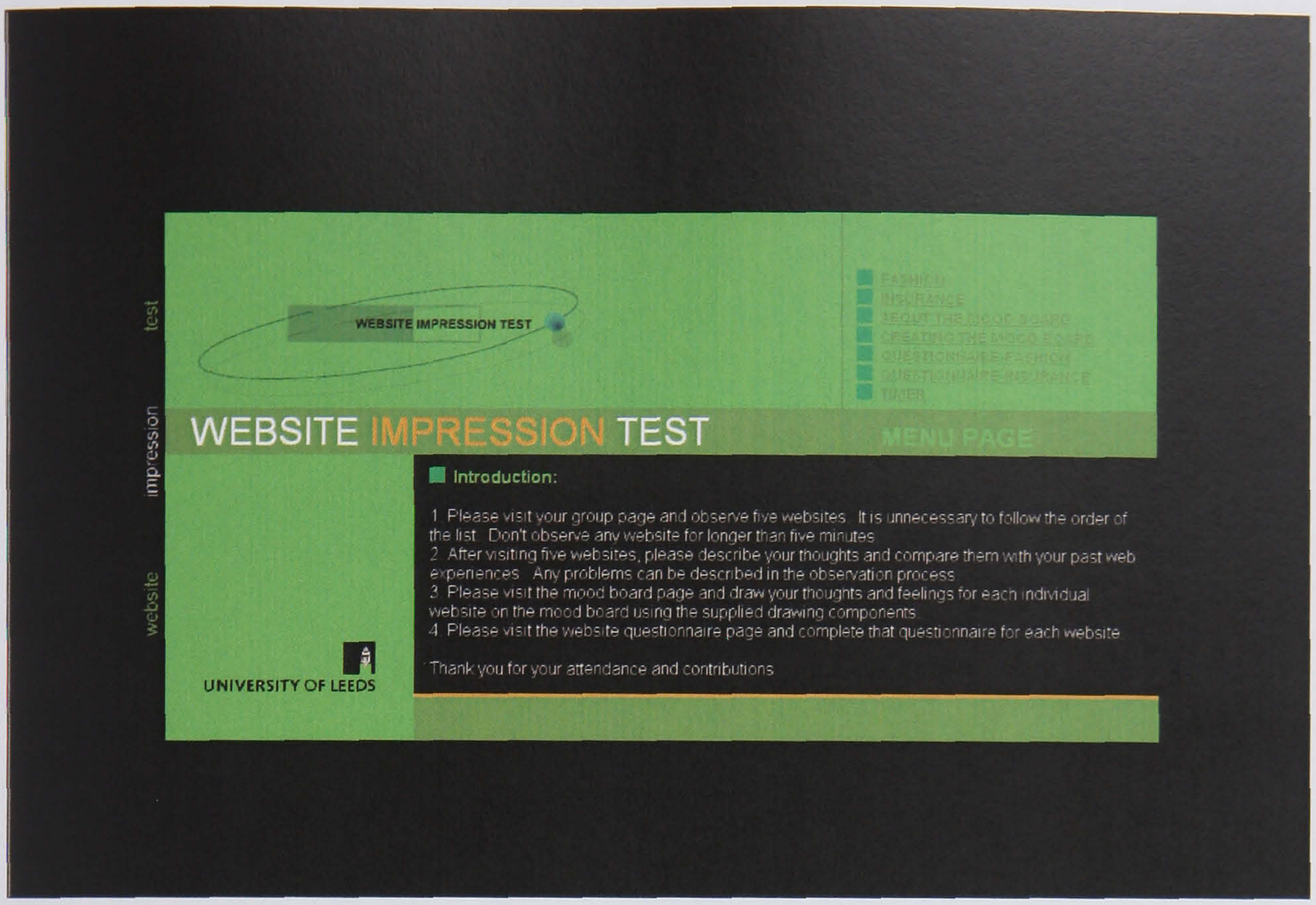


Figure 4.21 the menu page of the website impression test site

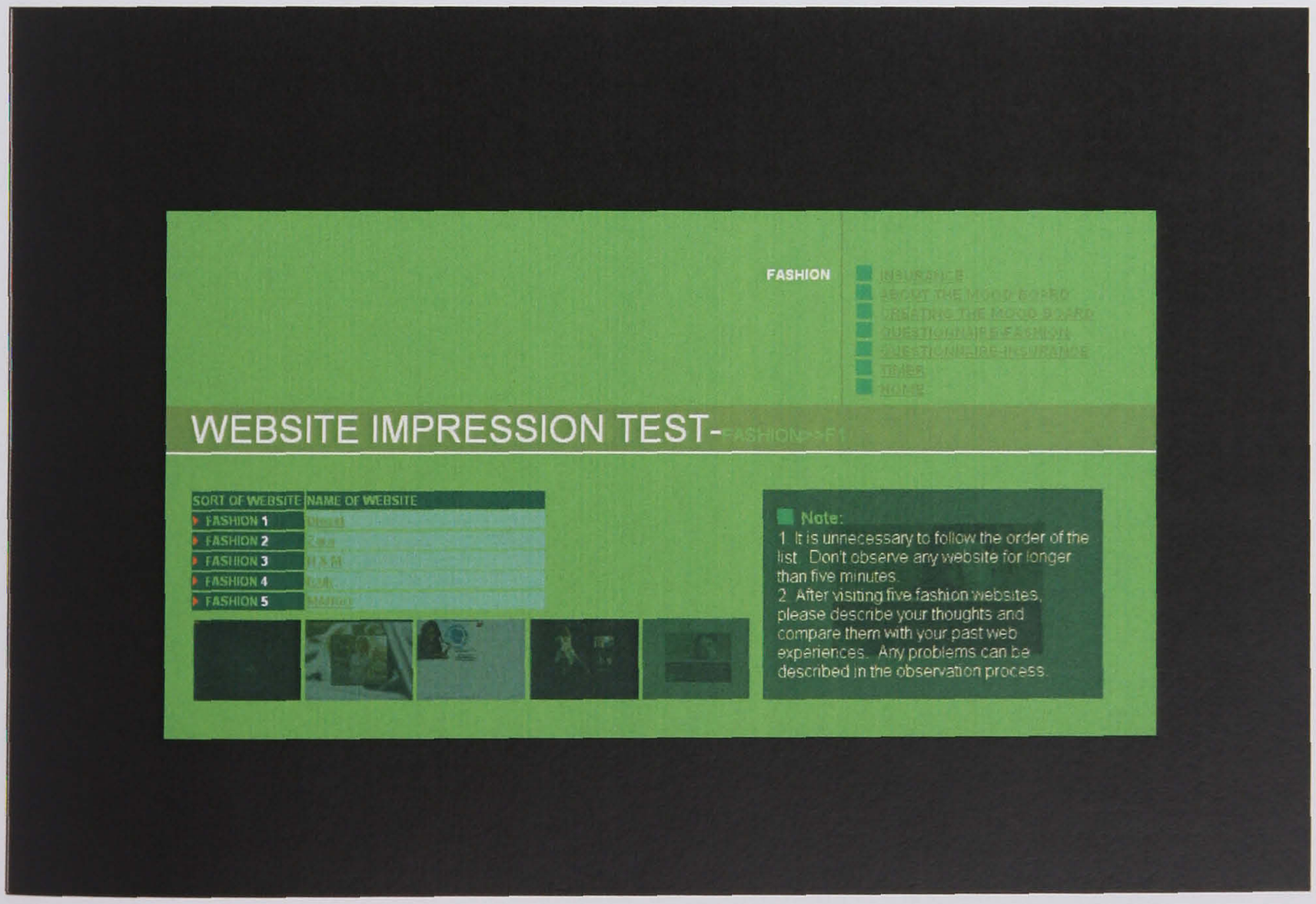


Figure 4.22 the fashion page of the website impression test site

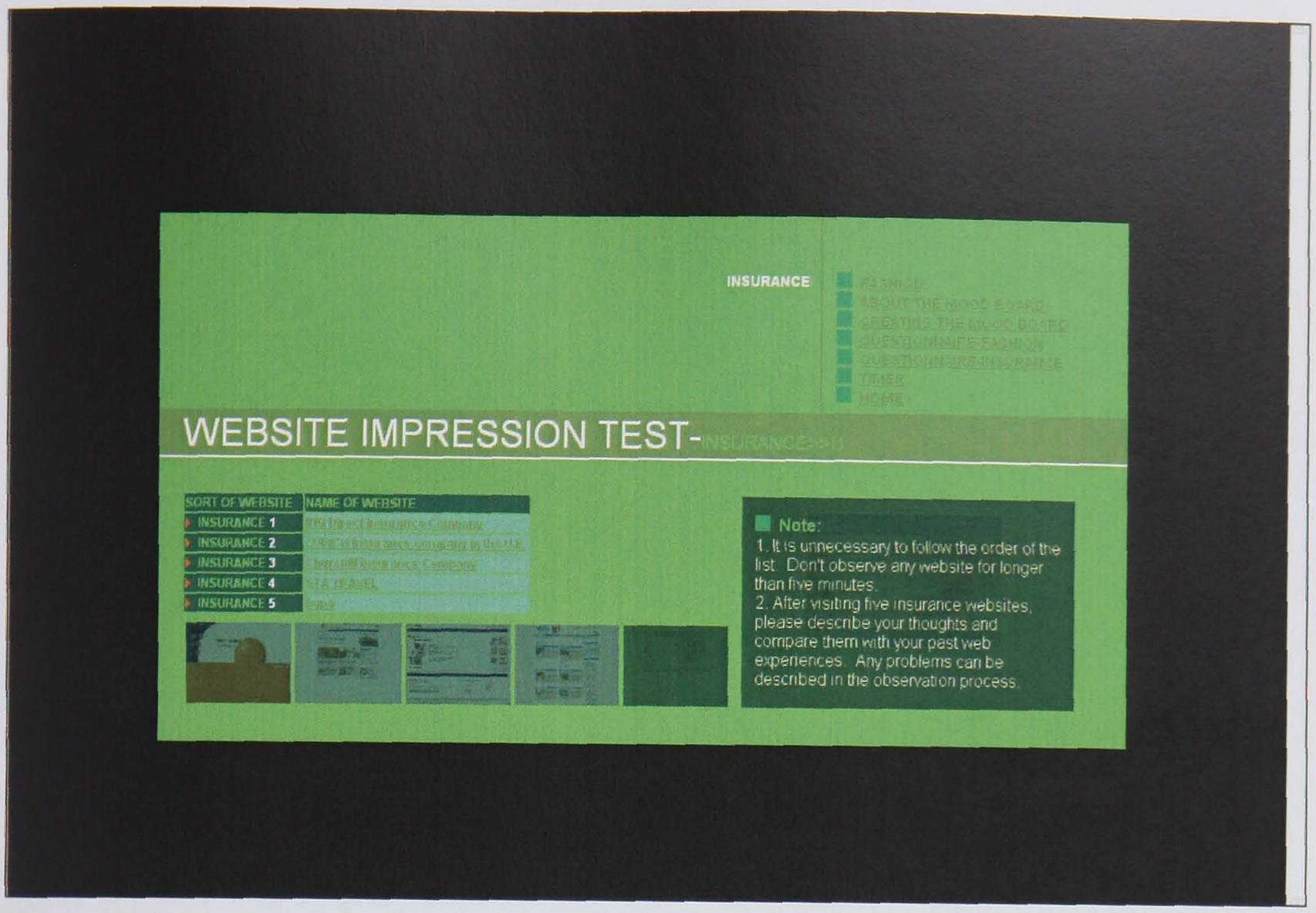


Figure 4.23 the insurance page of the website impression test site

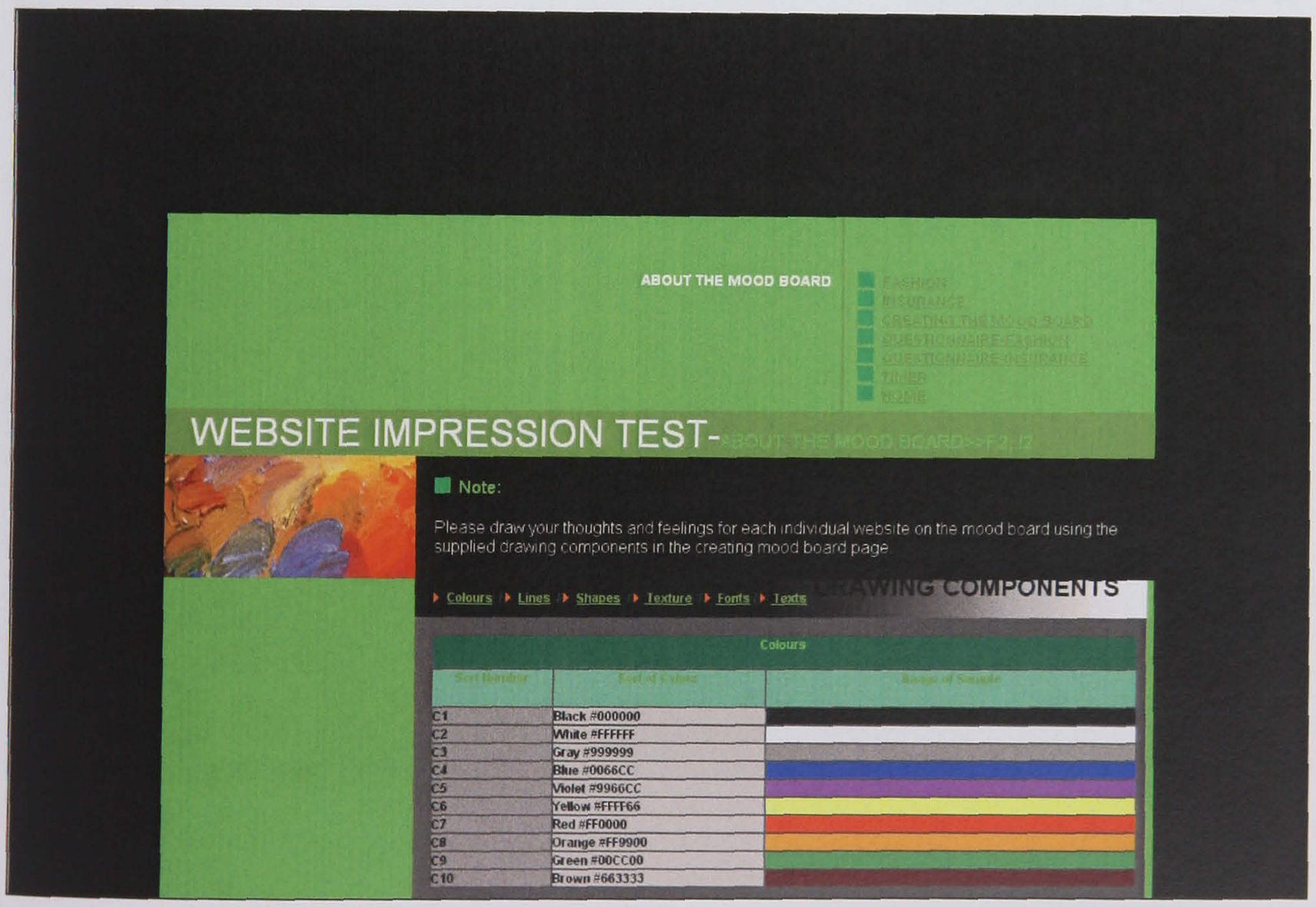
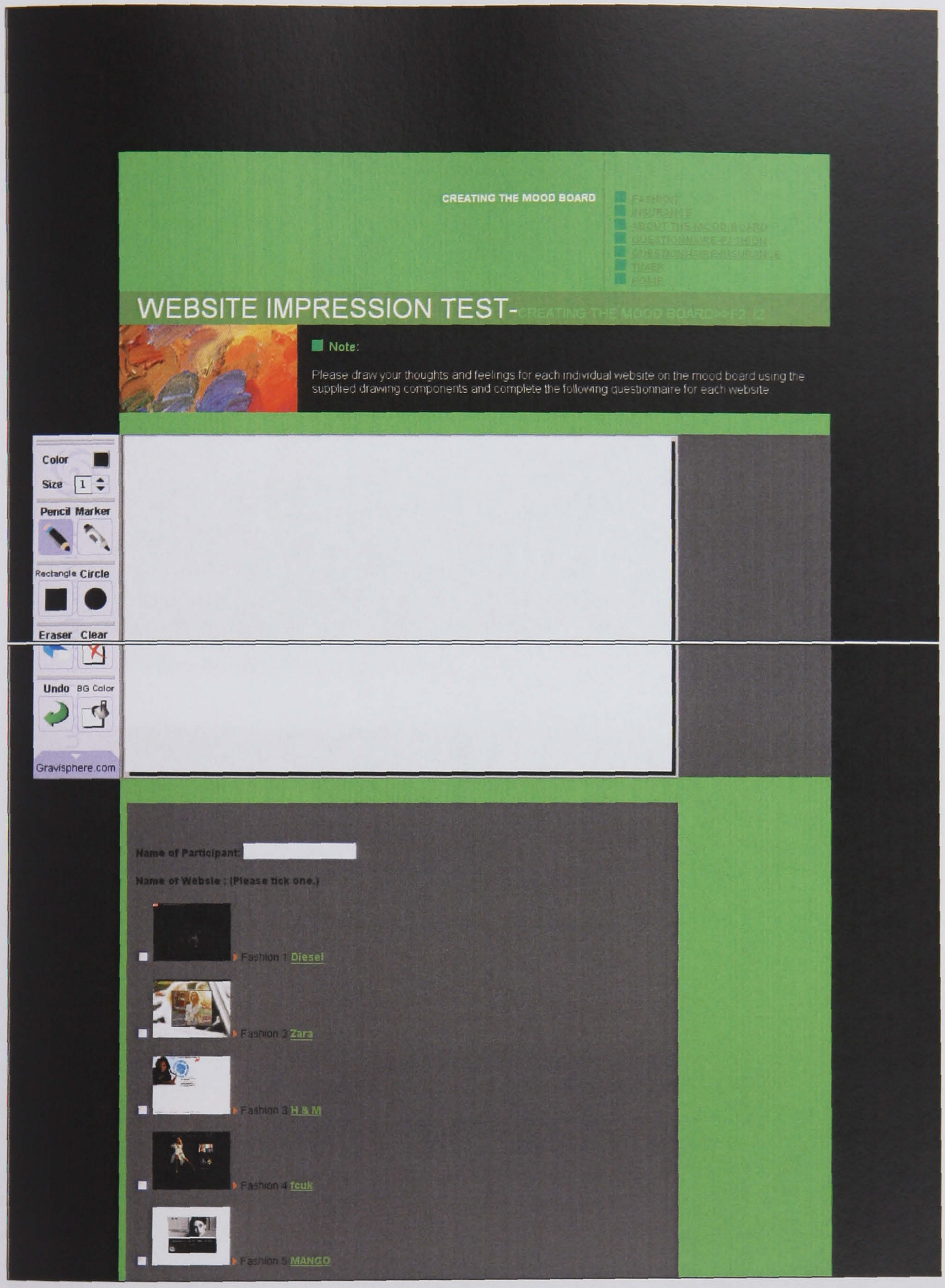


Figure 4.24 the about the mood board page of the website impression test site


CREATING THE MOOD BOARD
FASHION
INSURANCE
ABOUT THE MOOD BOARD
QUESTIONNAIRE FASHION
QUESTIONNAIRE INSURANCE
TIMER
HOME
WEBSITE IMPRESSION TEST-CREATING THE MOOD BOARD
Note:
Please draw your thoughts and feelings for each individual website on the mood board using the supplied drawing components and complete the following questionnaire for each website
Color
Size
1
Pencil
Marker
Rectangle
Circle
Eraser
Clear
Undo
BG Color
Gravisphere.com
Name of Participant:
Name of Websie : (Please tick one.)
Fashion 1 Diesel
Fashion 2 Zara
Fashion 3 H & M
Fashion 4 fcuk
Fashion 5 MANGO

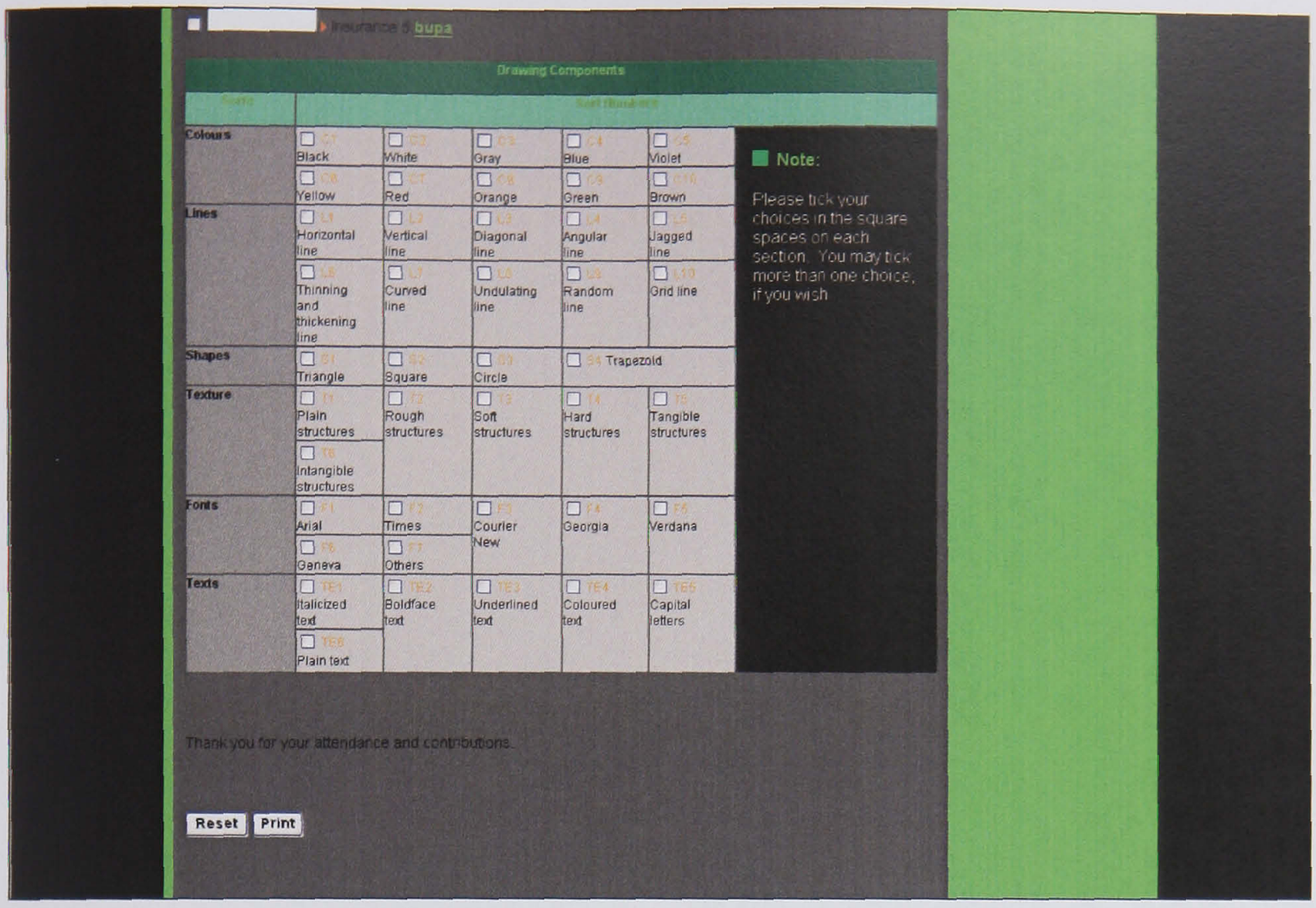


Figure 4.25 the creating the mood board page of the website impression test site

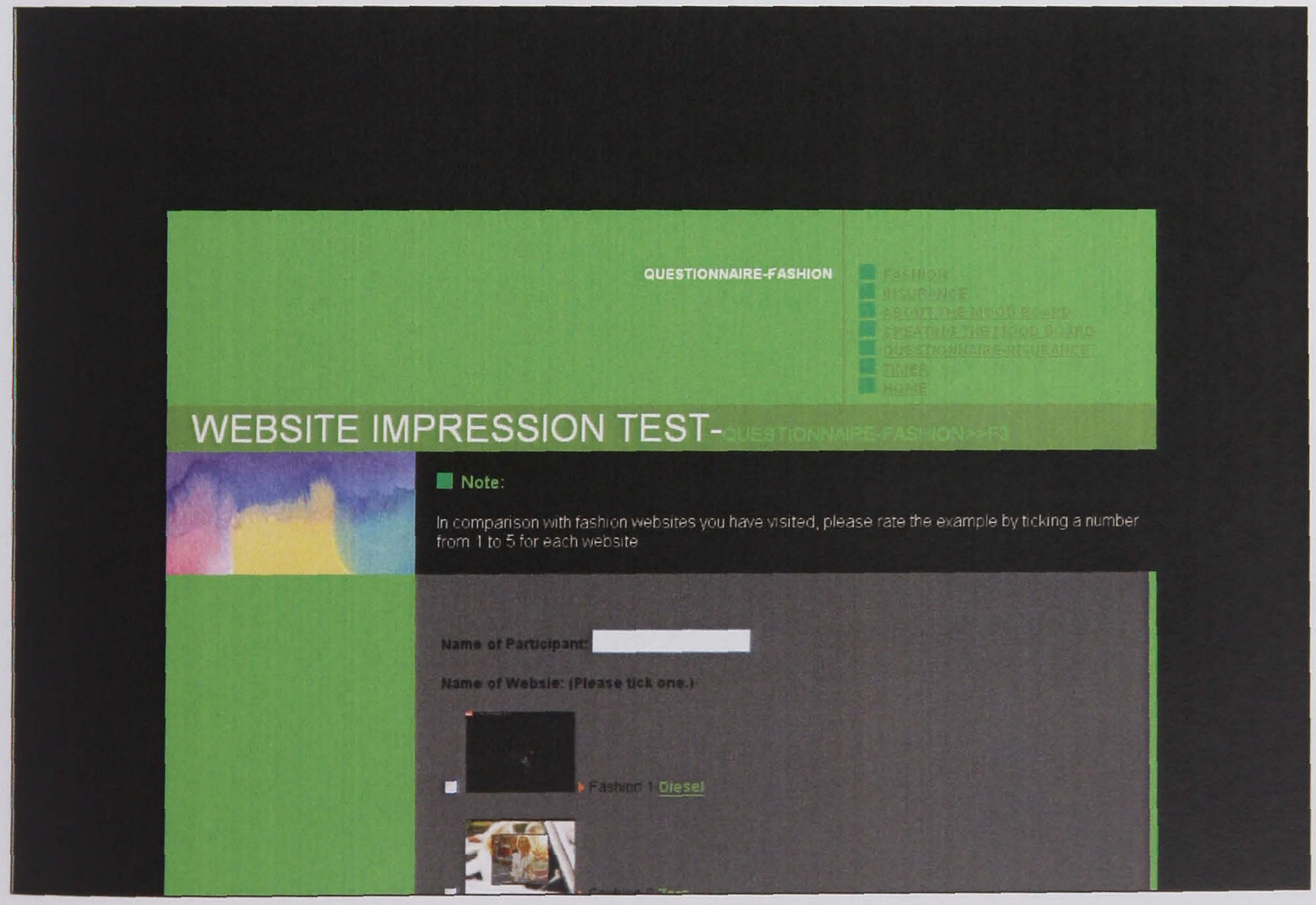
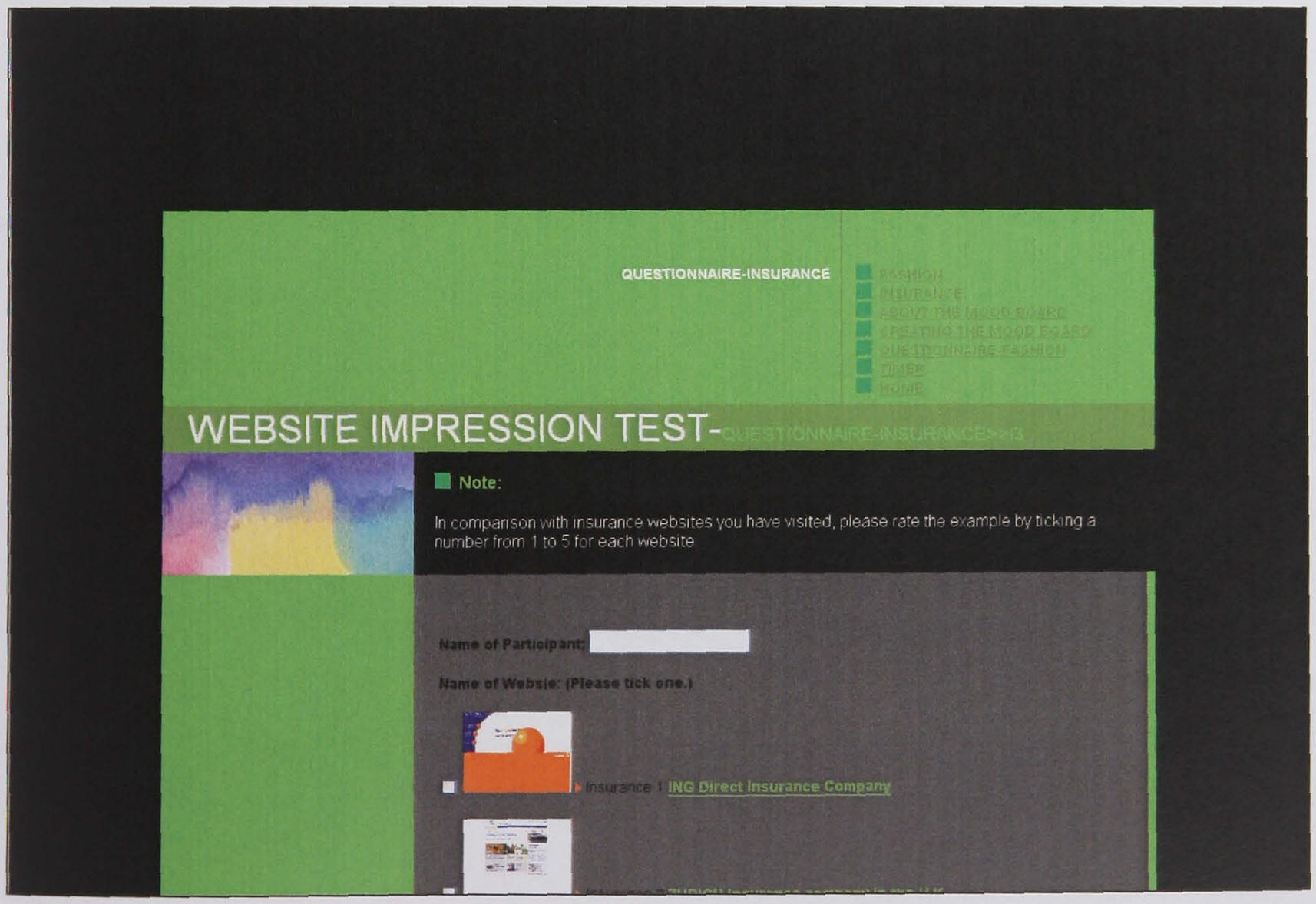


Figure 4.26 the questionnaire-fashion page of the website impression test site



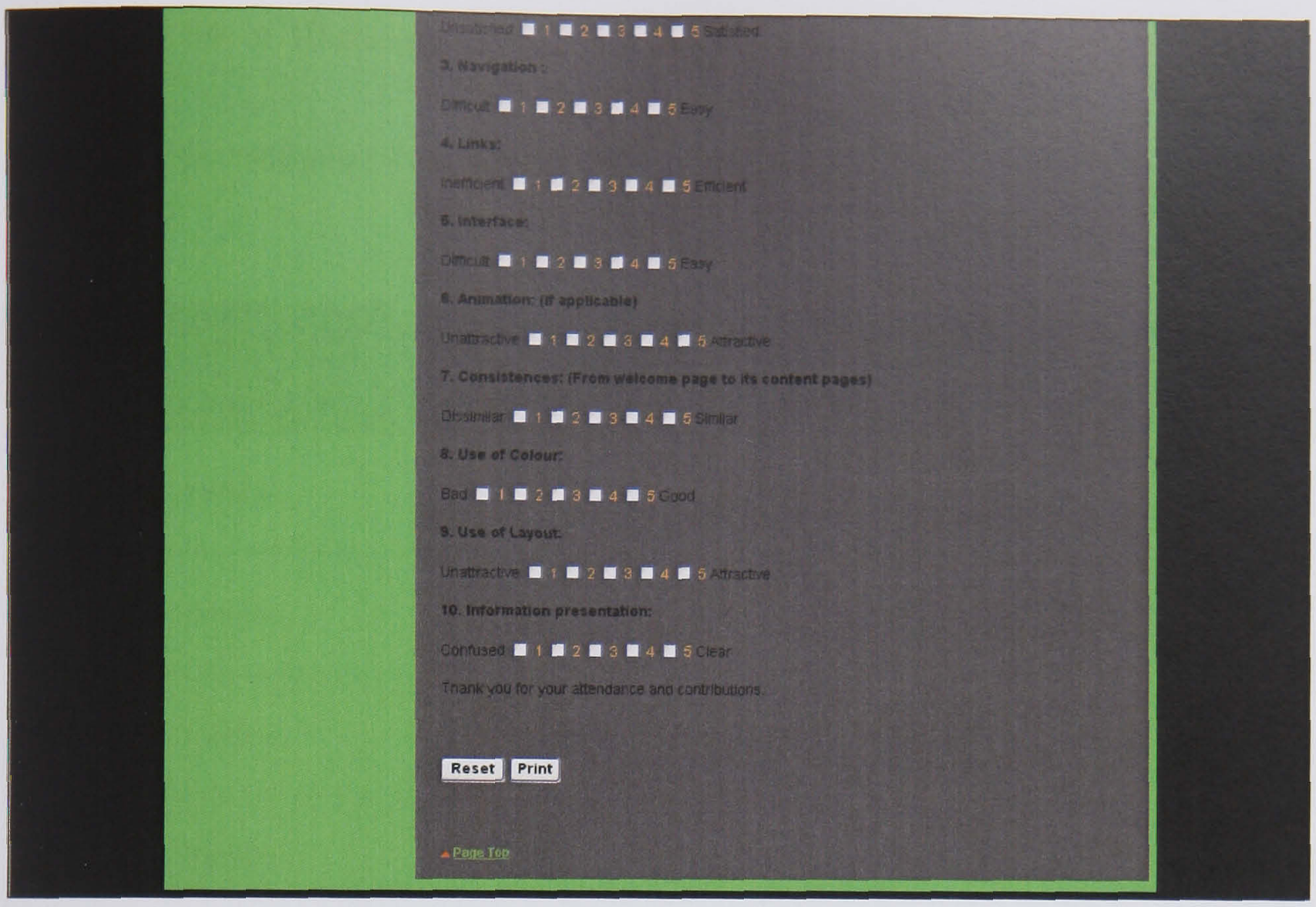


Figure 4.27 the questionnaire-insurance page of the website impression test site

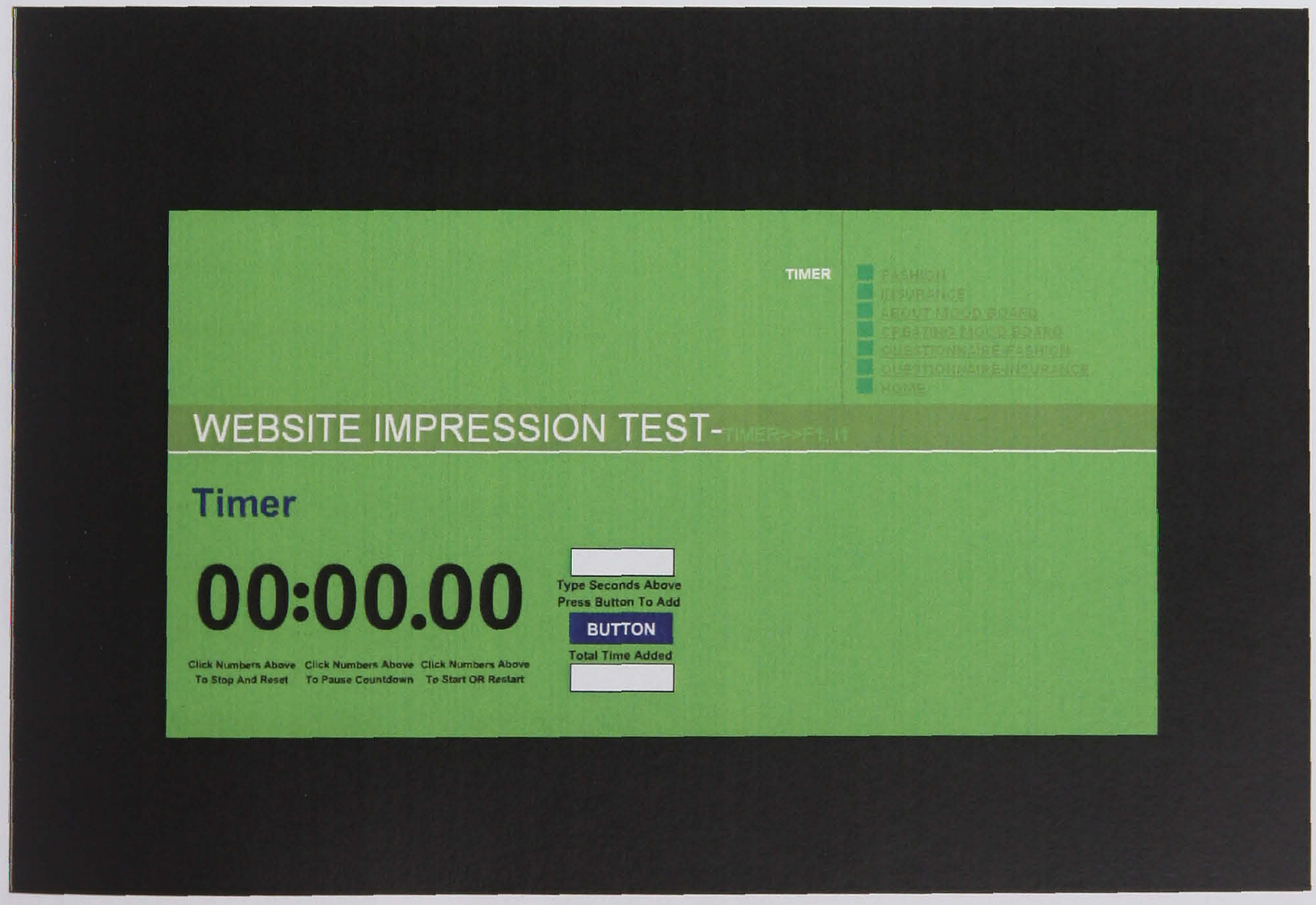


Figure 4.28 the timer page of the website impression test site

Table 4.29 shows the ten website samples. The images of websites in figure 4.30 show the ten website samples.

Table 4.29 list of 10 chosen website samples

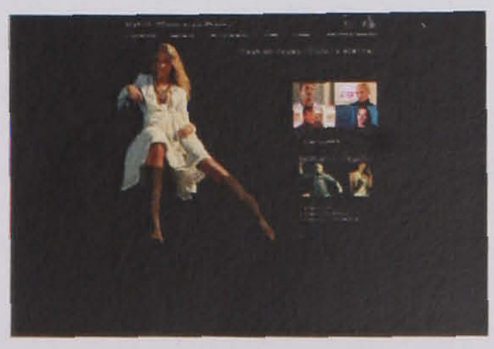
All of the test websites were downloaded in the period from 1st April 2006 to 15th April 2006.

Website Samples			
Codes	Sort of Website	Name of Website	Website Addresses
A1	Fashion	Diesel	http://www.diesel.com/site.html
A2	Fashion	Zara	http://www.zara.com/v06/index.html
A3	Fashion	H & M	http://www.hm.com/
A4	Fashion	Fcuk	http://www.frenchconnection.com/home_06ss.html
A5	Fashion	Mango	http://www.mango.com/e/prehome.asp
B1	Insurance	Ing	http://home.ingdirect.com/
B2	Insurance	Zurich	http://www.zurich.co.uk/home/Welcome/Introduction.htm
B3	Insurance	Churchill	http://www.churchill.com/
B4	Insurance	Sta Travel	http://www.statravel.co.uk/cps/rde/xchg/uk_division_web_live/hs.xsl/insurance.htm
B5	Insurance	Bupa	http://www.bupa.co.uk/promotionscc5740/

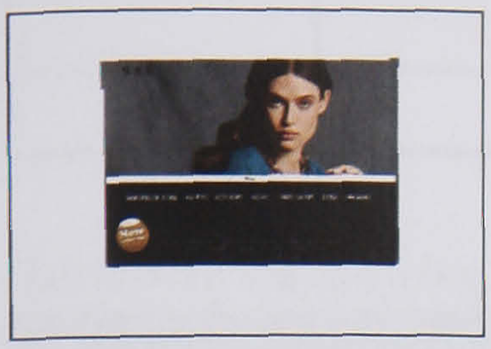
A1

A2

A3

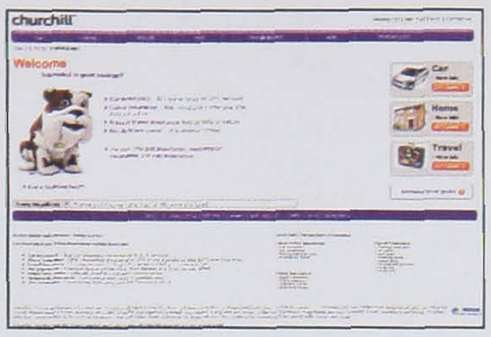


A4

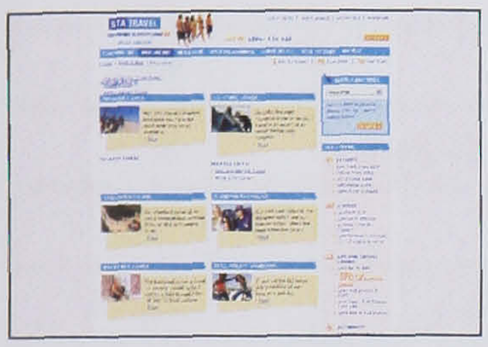

A5


B1


B2



B3


B4


B5

Figure 4.30 images from the 10 website samples

The about mood board page and the creating the mood board page contained a few basic drawing components. These drawing components were also part of protocol data in this website impression test. Different components have different emotional meanings in terms of Cognitive Psychology. These drawing components and their background meanings are shown below in tables 4.31 to 4.36. Some intensive internal influences and special participants' opinions were recorded in their text translations. A camcorder was used in the test process in order to record the participants' protocol opinions and observation processes.

Table 4.31 the drawing components-colours

Colours		
Codes	Sort of Colour	Mood
C1	Black	Cool, stylish, elegant, and mystery
C2	White	Purity, holy, death, and truth
C3	Gray	Sad, stable, unhappy, and gloomy
C4	Blue	Assured, peaceful, distanced, and far
C5	Violent	Dignified, gloomy, dubious, and unhappy
C6	Yellow	Light, clear, free, and moved
C7	Red	Active, stimulating, challenging, bossy, and cheerful
C8	Orange	Hearty, luminous, lively, happy, and carefree
C9	Green	Calming, relaxed, peaceful, budding, refreshing, and

		passive
C10	Brown	Stable, warm, and natural

Table 4.32 the drawing components-lines

Lines		
Codes	Type of Line	Mood
L1	Horizontal line	Peace and stable
L2	Vertical line	Holly and stable
L3	Diagonal line	Full of tension, constructive, dynamic, and unstable
L4	Angular line	Tension, constructive, dynamic, stress, and unstable
L5	Jagged line	Tension, constructive, dynamic, stress, and unstable
L6	Thinning and thickening line	Changeable, fun, and unstable
L7	Curved line	Elegant, fun, feminine, and unstable
L8	Undulating line	Changeable, tension, fun, and routine
L9	Random line	Changeable, fun, tension, and dynamic
L10	Grid line	Routine and stable

Table 4.33 the drawing components-shapes

Shapes		
Codes	Type of Shape	Mood
S1	Triangle	Full of tension, constructive, dynamic, and unstable
S2	Square	Masculine, certain, hard, cold, and rational
S3	Circle	Feminine, uncertain, soft, warm, and emotional
S4	Trapezoid	Random, unstable, moved, and dynamic

Table 4.34 the drawing components-texture

Texture		
Codes	Sort of Texture	Mood
T1	Plain structures	Smooth and stable
T2	Rough structures	Dynamic and changeable
T3	Soft structures	Smooth, soft, comfortable, and unstable
T4	Hard structures	Hard, certain, stable, and durable
T5	Tangible structures	Real and stable
T6	Intangible structures	Unreal and unstable

Good typography involves the use of text and typeface to create a visual atmosphere that is both appealing to the eye and appropriate to the content of the web page. Both

the style and size of fonts should be understood in design processes.

Table 4.35 the drawing components-fonts

Fonts		
Codes	Type of Font	Mood
F1	Arial	Traditional, warm, and soft
F2	Times	Traditional, sharp, and stable
F3	Courier New	Modern and sharp
F4	Georgia	Modern and sharp
F5	Verdana	Modern and soft
F6	Geneva	Modern and soft
F7	Others	New and modern

In this section, there are a great number of fonts that can be used in website design. The fonts were chosen from the built-in fonts of Dreamweaver. The choice of fonts can obviate visual problems and text performance of the browsers.

Lynch and Horton (2001: 132 and 133) supplied some guidelines about the choice of texts in web design processes. Six sorts of text were used here: italicized text, boldface text, underlined text, coloured text, capital letters, and plain letters. The concepts for choosing texts can help designers to make better decisions in the design process. Because texts in websites have two functions for users, both readability and navigation should be considered in the design process.

Table 4.36 the drawing components-texts

Texts		
Codes	Style of Text	Mood
TE1	Italicized text	Attractive and elegant
TE2	Boldface text	Emphasized and clear
TE3	Underlined text	Functional and dynamic
TE4	Coloured text	Functional, emphasized, and dynamic
TE5	Capital letters	Emphasized and effective
TE6	Plain letters	Normal

Two main concepts were used to construct this test website. The first consideration was to supply better test processes for the participants. After conducting the second pilot test (S.P.T.), visual presentations of the test website, the structure of the test

website, and some web functions were changed in order to achieve this aim. In addition, the second consideration was to cut down the test time to an acceptable level. Through decreasing the numbers of test websites and supplying explanations at the appropriate time on the menu and content pages, this situation was reduced to one hour.

In the test processes, the participants sometimes remained silent or felt confused during the initial test stage. In addition, the participants preferred to respond as simply as possible. For these reasons, it was necessary to reduce the test time and test processes in order to get better test results.

4.7 Website impression test processes

4.7.1 A pilot test for constructing the test website

Since no more than twenty-five minutes was required to observe the test websites, the problem of the participants' eyestrain was not considered in the design process. In general, the participants followed three steps to carry out the test. From observing the test websites, producing mood boards, and ticking questionnaires, the participants could easily follow this test process, without experiencing too many errors or confusion at each stage. At the mood board page, participants often needed to take note of the applied information, especially the texts and fonts. The image information helped the participants to complete the tests. Many participants did not like to use the mouse to scroll down pages to search information. Most fashion websites were designed to obviate the need to use the mouse, but the insurance websites were all designed in this way, which easily caused the participants to feel annoyed in the test processes. Although the insurance websites always contained a great amount of text information, its information presentation and the classifications of the information should be improved in order to make the users feel comfortable about using the web utility.

On average, all of the tests could be finished in around one hour at the centre for visual communication of the school of design. The second pilot test (S.P.T.) was conducted in four hours and forty-five minutes.

4.7.2 Website impression test processes

The website impression test was conducted from June 2006 to August 2006. From

education to technical know-how, the participants' background information shows below in table 4.37. From education to test time, all of the participants fulfilled the demands of the previous test plan.

Table 4.37 the statistics of participants' background information

The Statistics of Participants' Background Information		
Sort of Website	Group A: Fashion	Group B: Insurance
Education	Above B.A	Above B.A
Web Experience	Experienced	Experienced
Age	26.3 years	29.6 years
Gender	Male: 0 Female: 10	Male: 7 Female: 3
Location	Leeds	Leeds
Technical Know How	Good level	Good level

One male and one female attended the second pilot test (S.P.T.). Thirteen females and seven males attended the formal test. At the test process, all participants had visited the test websites before. This means that the participants did not need to familiarize themselves with these test websites for too long.

After conducting the second pilot test (S.P.T.), the typical Think-Aloud usability testing method was changed into a negotiated method to carry out these tests. In the process of the second pilot test (S.P.T.), this section was conducted by the normally accepted method. Through observing several test processes and comparing the participants' opinions, this method was improved to add some simple questions to stimulate the participants to search for more questions and improve their confidence about doing the test. Some of the participants sometimes felt puzzled about using terminology or the navigation of the test websites. Through conducting this improved method, the test was carried out in a smoother manner.

4.8 Summary

Some negative or positive users' emotional responses resulted from web usability but others were caused by other design elements. Using basic questionnaires concerned with basic web usability can help researchers to explore additional design problems. By calculating mean values and standard deviations, the results of the questionnaires can improve the disadvantages of Think-Aloud usability testing in the research process. Qualitative research sometimes needs to be supported by quantitative data.

Table 4.38 shows the main phases of the methodology employed in this study.

Table 4.38 the phases of the methodology

The Phases of the Methodology:

Phase 1:

Determining Think-Aloud test method, designing questionnaires, and Emotional Probes testing: identify websites and carry out the website impression test

Phase 2:

Data Analysis: carry out the website impression test, data analyses of the results of the participants' protocol data, Emotional Probes testing, and the results of the questionnaires

Phase 3:

Making the website design reference model from the data analysis: create and carry out the verification and validation of research outcomes

C. Dudek and G. Lindgaard stated some concepts about measuring user satisfaction on the web, as shown below:

1. The interview statements were categorized and quantified to separate the functional or usability aspects of the site from affective components.
2. The qualitative data were transformed using a quantifiable method that allowed the comparison of the user's experiences under varying conditions of task expectation and requirement, for the subjects were aware of whether or not their task performance would be measured during the experiment.
3. A content analysis was performed last, allowing us to probe the way in which the users categorize websites, … …

(Dudek and Lindgaard, 2004: the introduction)

There remained some difficulties in involving all of the generic factors in the initial research stage. After conducting several tests, the relationship between the design factors and users' emotions was identified clearly.

Chapter 5 Data Analysis and Test Results

5.1 Introduction

This chapter provides the analysis of the results and research findings of the website impression test (W.I.T.). The main purpose is to create a website design reference model in order to produce a website which can meet the requirements of the research results and for future use for website designers.

The main groups were fashion and insurance websites chosen after conducting the initial pilot test (I.P.T.). The test results are presented in three different forms of data which contain the results of the participants' protocol data, the results of Emotional Probes testing, and the results of questionnaires. Through using triangulation, a reference model was developed from the findings.

5.2 The analysis strategy

The author would like to observe that the approach to the methodology for this research programme is that of a designer not skilled in the use of statistics. Means and standard deviations have been used but there has no attempt to use sophisticated statistical tools such as analysis of variance or principal component analysis. The author has, instead, used triangulation of the tools used in the investigation. The validation of the reference model has been tested using a trial website constructed from the guidelines of the model. It should also be noted that the use of triangulation has resulted in references being made to findings from other tools being included in the discussion before the relevant tools results are reported. The author suggests that this is an artefact of the methodology and hopes that the reader will be comfortable with this.

The website impression test (W.I.T.) consisted of three different methods for detecting the participants' emotions, which were Think-Aloud usability testing, EPs (Emotional Probes) testing, and questionnaires. The evaluations also consist of two sets of values, which were a coding system and statistics (Mean Values and Standard Deviations).

For the Think-Aloud test, codes were assigned for ten factors (navigation, loading time, links, interface, sound, animation, emotion, colour, readability, content), and any personal comments. This consideration covered the users' emotional responses to the website impressions and the emotional responses to the web usability. From

navigation to personal comments, each factor was coded. Each factor was assigned four codes. These are xx, x, y, and yy. X means positive and Y means negative. In addition, double x or double y means very positive or very negative. The codes are shown below in table 5.1. These codes were decided from the classification of the questionnaire and improved by conducting the test.

Table 5.1 codes for the participants' protocol data

Factors	Codes			
Navigation	Axx	Ax	Ay	Ayy
Loading time	Bxx	Bx	By	Byy
Links	Cxx	Cx	Cy	Cyy
Interface	Dxx	Dx	Dy	Dyy
Sound	Exx	Ex	Ey	Eyy
Animation	Fxx	Fx	Fy	Fyy
Emotion	Gxx	Gx	Gy	Gyy
Colour	Hxx	Hx	Hy	Hyy
Readability	Ixx	Ix	Iy	Iyy
Content	Jxx	Jx	Jy	Jyy
Personal comment	K			

When analyzing the participants' protocol data to produce rank orders, the producer for weighting positive and negative comments was calculated using a point system in order to supply appropriate numerical score and support the rankings. By using a coding system and a point system, each factor and its influences can be discussed in order to establish the foci for the website reference model.

The second tool used was to design a mood board at the test website by participants. The use of this form of Emotional Probes (EPs) to detect users' emotional responses to the test websites, can supply further understanding of the visual details and better web styles for designers. Through performing basic analysis, this method can help to reveal the relationships between the users' impressions and the visual performance of the websites. In addition, by comparing the participants' images, the statistics of the questionnaires, and the real visual performance of the test websites, the web design styles of the test websites could be established in this research.

Emotional Probes is a method for capturing the participants' impressions and visual images. At the initial stage of the research, this method was used to discuss the relationship between the basic visual factors and the participants' impressions.

Through conducting the website impression test (W.I.T.), web design style may also be influenced by other design factors, not only graphic factors. In this part, the EPs results supplied efficient information and details for each visual factor. These results helped to construct the parts of the website reference model which relate to colour and interface.

After conducting five boards, participants completed supplemental questionnaires for the five test websites. Design style was reflected in the style used in the mood board. The questionnaire in this part consisted of six factors. These factors were colours, lines, shapes, texture, fonts, and texts. Each factor was assigned several codes. The participants could tick more than one answer for each factor. The author could judge the design style and compare the visual factors from the supplemental questionnaires. In addition, the EPs results was also compared with the results of parts one and three which were concerned with visual factors.

In the main questionnaire section, through calculating the SD (Standard Deviations) and MV (Mean Values), the participants' opinions about the design factors of the web questionnaire can be discussed and compared. This method was also used in the initial pilot test (I.P.T.) in order to search what kinds of websites to use in the main test.

The standard deviation measures the spread of the data for the mean value. This method is useful in comparing a great amount of data which may have the same mean but a different range. Through comparing the results of individual factors, the author could find the performance of the design factors in order to decide which test website provided better performances in terms of these.

The main questionnaire was classified into ten factors with eleven pairs of adjectival nouns (two pairs of the quality of content factor). These factors were quality of content, loading time, navigation, links, interface, animation, consistency, use of colour, use of layout, and information presentation. The selection range is from one to five for each factor.

The order of the website performance in each factor was decided through this part and the web performance is discussed further site by site.

5.3 The results of the participants' protocol data

After conducting the second pilot test (S.P.T.), the typical Think-Aloud usability

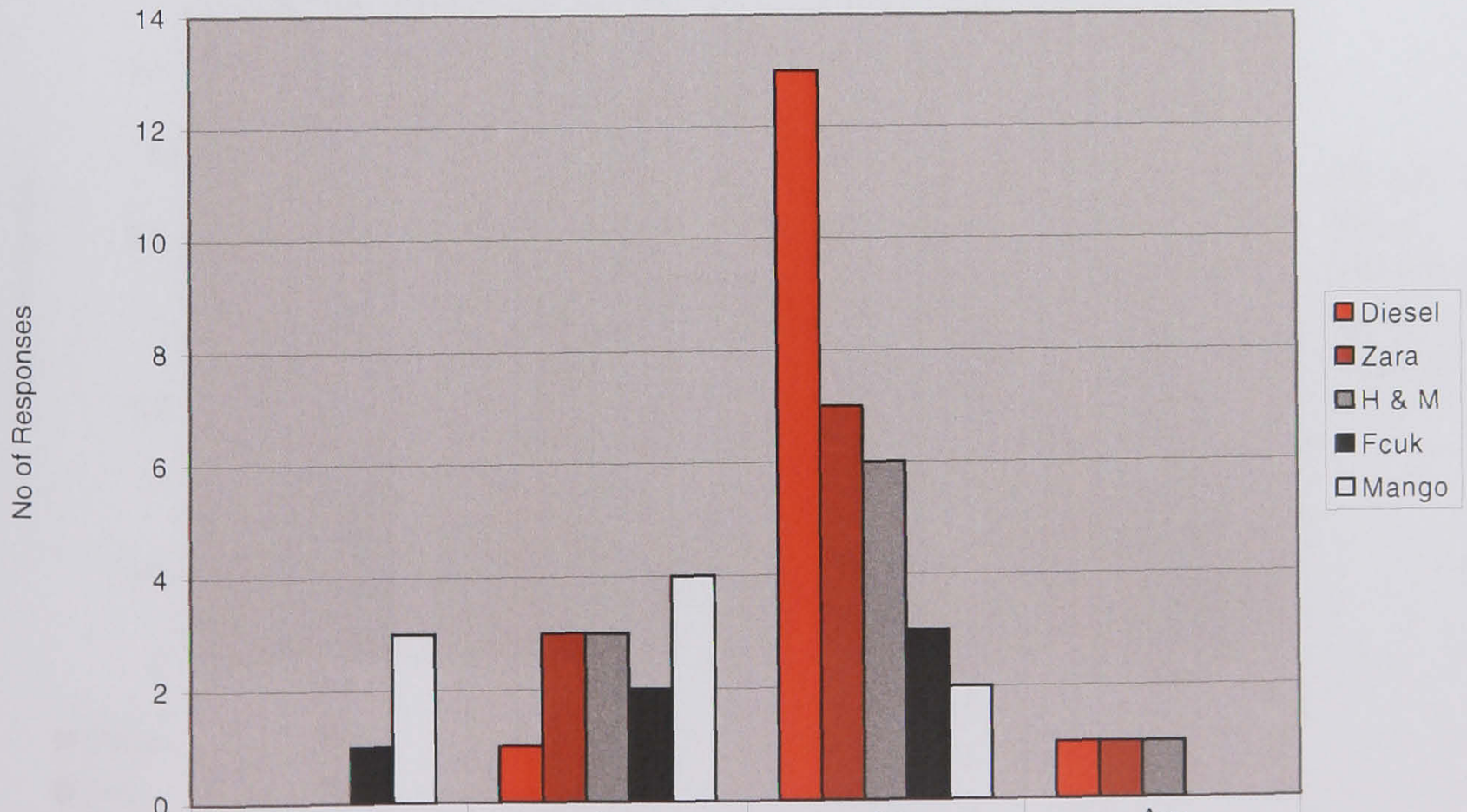
testing method was changed into a negotiated method to carry out these tests. During the second pilot test (S.P.T.), this part was conducted by the normal method. Through observing several test processes and comparing the participants' opinions, this method was improved to add some simple questions to stimulate the participants to search for more questions and improve their confidence about doing the test.

5.3.1 The fashion group

Factor A-Navigation

Figure 5.2 shows the total recorded for the navigation codes and a bar chart for the fashion group. Mango had the better performance in navigation. Fcuk was the second one in this factor. H & M was the third one. Zara was the fourth one. The worst website for navigation was Diesel.

On the Mango website, the navigation icons were placed at the bottom of the screen of the welcome page. On the content pages, navigations were placed on the right hand side with small images and drop down navigations are located in the middle of the welcome page. In addition, the Diesel website combined different design styles for navigation on different pages, which may have confused the participants.



	Axx	Ax	Ay	Ayy
Diesel	0	1	13	1
Zara	0	3	7	1
H & M	0	3	6	1
Fcuk	1	2	3	0
Mango	3	4	2	0

	Points
Diesel	-14
Zara	-6
H & M	-5
Fcuk	1
Mango	8

Figure 5.2 the results of factor A-navigation for the fashion group

Factor B-Loading Time

Figure 5.3 shows the values recorded and a bar chart for the loading time codes for the fashion group. The best performance of loading time in the fashion group was Mango. The worst website was H & M. Normally, loading time will be influenced by hardware and software. During the test process, the participants all used the same equipment and browser engine. Therefore this influence was removed. The only consideration in this test was the influence of the software. In the design field, web languages, the size of the websites, and their design components influence their performance in terms of loading time.

	Bxx	Bx	By	Byy
Diesel	0	1	0	2
Zara	0	2	0	1
H & M	0	0	1	2
Fcuk	1	0	0	1
Mango	3	4	1	0

	Points
Diesel	-3

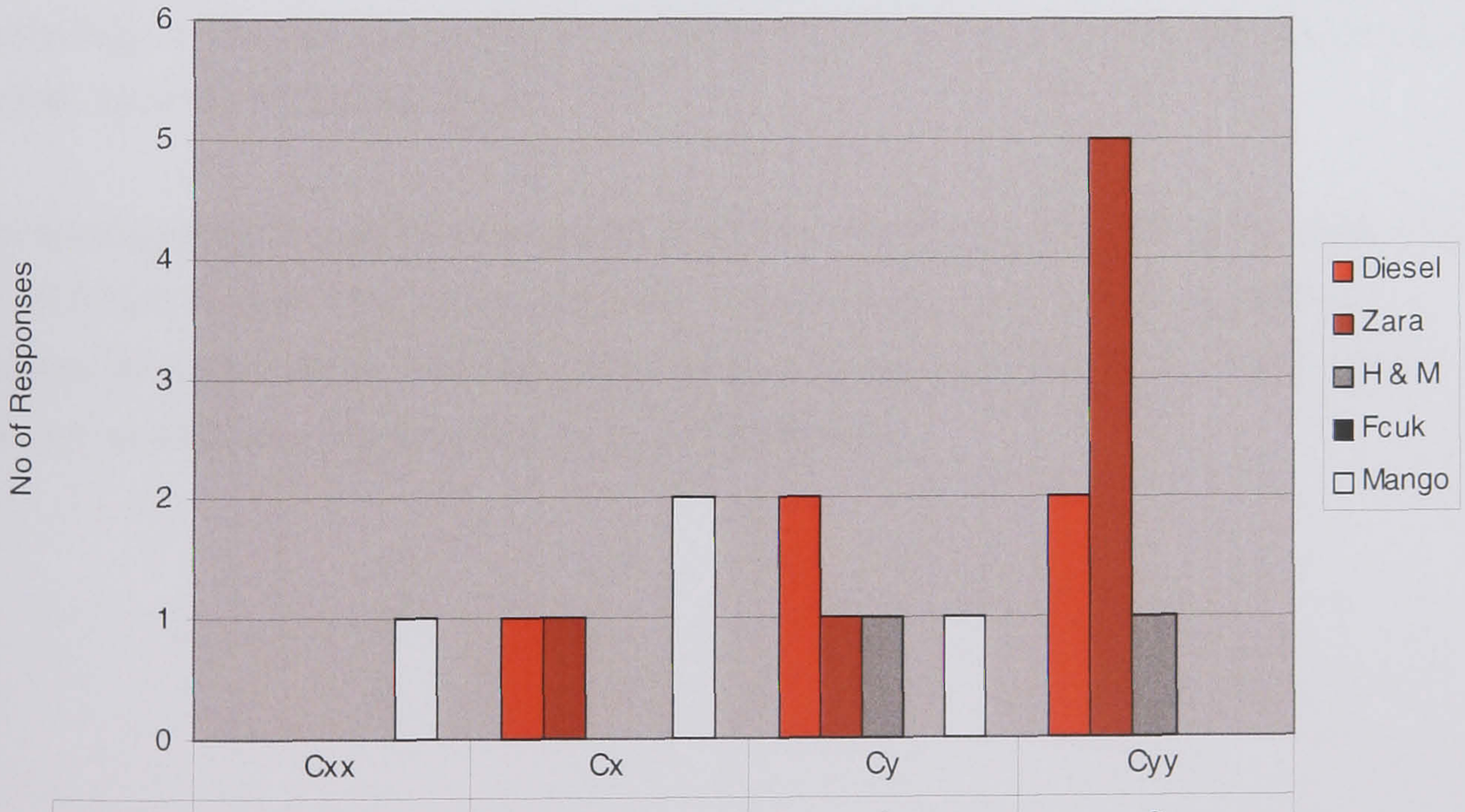
Zara	0
H & M	-5
Fcuk	0
Mango	9

Figure 5.3 the results of factor B-loading time for the fashion group

Factor C-Links

Figure 5.4 shows the values recorded and a bar chart for the links codes for the fashion group. Regarding this factor, the best website was Mango and the worst was Zara. Checking the participants' opinions, it was very important to distinguish internal links and external links for users. Mango supplied efficient and clear classifications in the links. The response time in the links was very short in order to meet the requirements of the users. In addition, the designers used different types of fonts to distinguish between the links and the contents. This design can help users to make their choices in a short time for linking.

The other three websites had similar performances regarding links.



Diesel	0	1	2	2
Zara	0	1	1	5
H & M	0	0	1	1
Fcuk	0	0	0	0
Mango	1	2	1	0

	Points
Diesel	-5

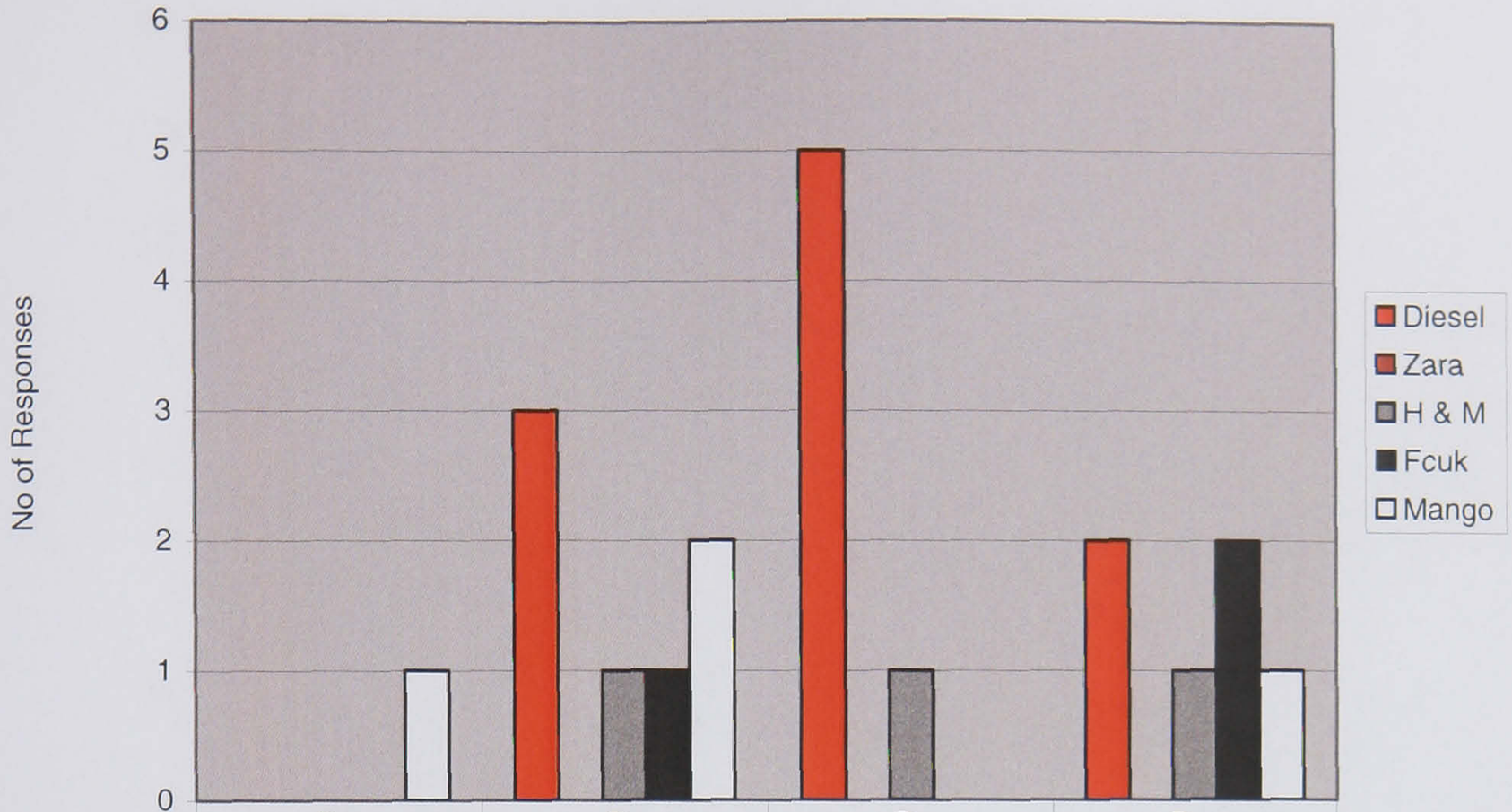
Zara	-10
H&M	-3
Fcuk	0
Mango	3

Figure 5.4 the results of factor C-links for the fashion group

Factor D-Interface

The results for factor D-interface are shown in figure 5.5. The best website in terms of interface was Mango. Regarding this factor, the participants had varying opinions about Diesel. Its results regarding the interface are Dx: 3, Dyy: 2, and Dy: 5. For the Diesel website, this point could be argued. On the one hand, good layout design can give the participants positive emotions about this website. Ignoring some multimedia functions, which can be controlled by users causing negative emotions for the participants, the participants had positive emotions from using the brand new interface design of Diesel. In addition, the Mango website supplied a zoom function for users. Many participants thought that this design was very good for understanding what will happen in the next step and seeing the details of the products. However, to supply a great number of images on the web pages could be accepted by participants easily. Designing in this way can supply better accessibility for users. Many participants had similar opinions about this point.

The development of equipment and browsers strongly influences the performance of the interface design. During this test, this consideration need not be considered because the participants used the same equipment and browsers in the test process. But, for website design, this factor is very important.



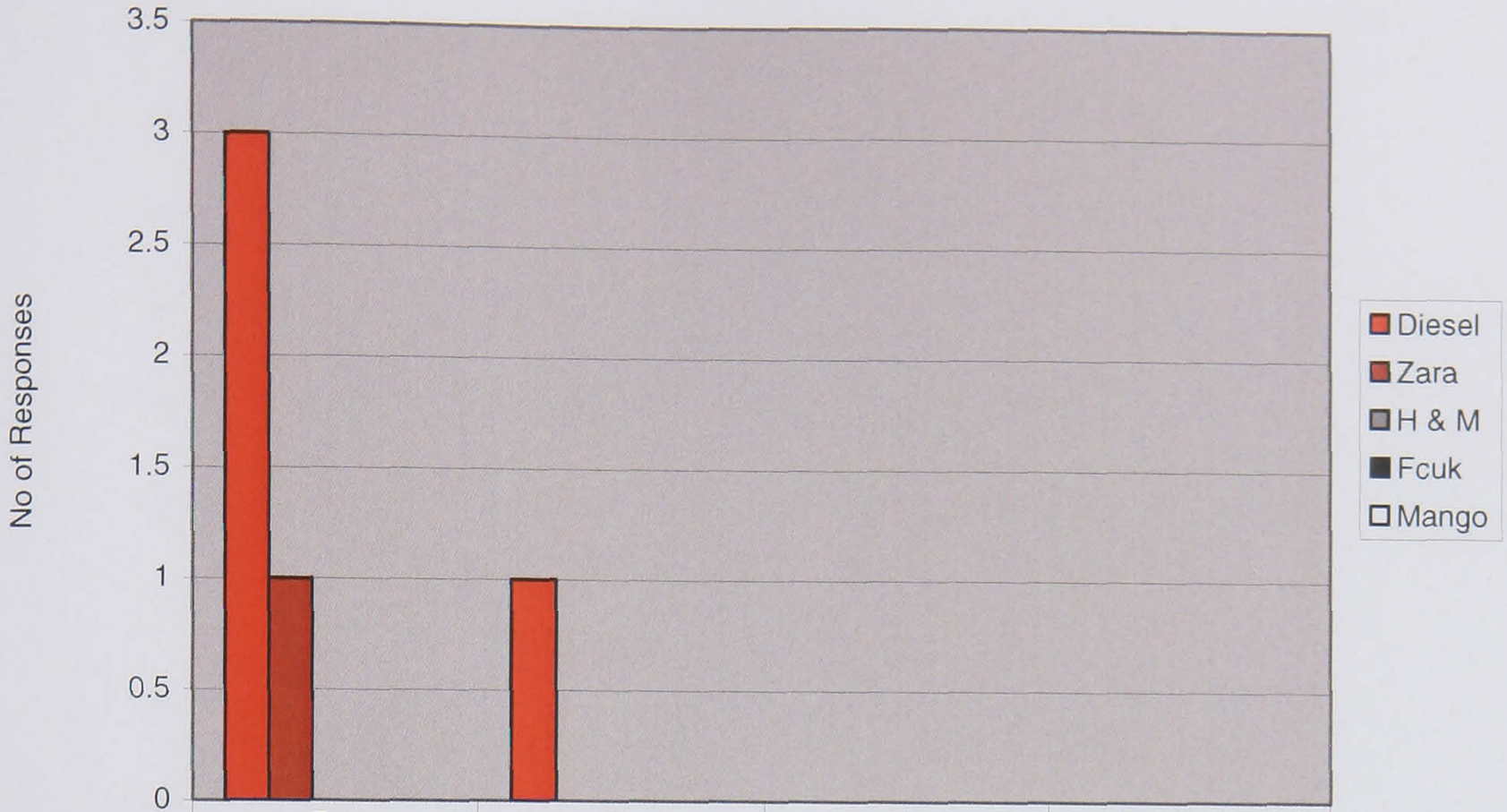
	Dxx	Dx	Dy	Dyy
Diesel	0	3	5	2
Zara	0	0	0	0
H & M	0	1	1	1
Fcuk	0	1	0	2
Mango	1	2	0	1

	Points
Diesel	-6
Zara	0
H & M	-2
Fcuk	-3
Mango	2

Figure 5.5 the results of factor D-interface for the fashion group

Factor E-Sound

Figure 5.6 shows the values recorded for the sound codes and a bar chart for the fashion group. For the fashion group, the best website for sound was Diesel. The second one was Zara because one participant thinks that the camera sound was a good design when changing images. Many participants think that the sound effect was designed well in Diesel. Only Diesel and Zara used sound.



	Exx	Ex	Ey	Eyy
Diesel	3	1	0	0
Zara	1	0	0	0
H & M	0	0	0	0
Fcuk	0	0	0	0
Mango	0	0	0	0

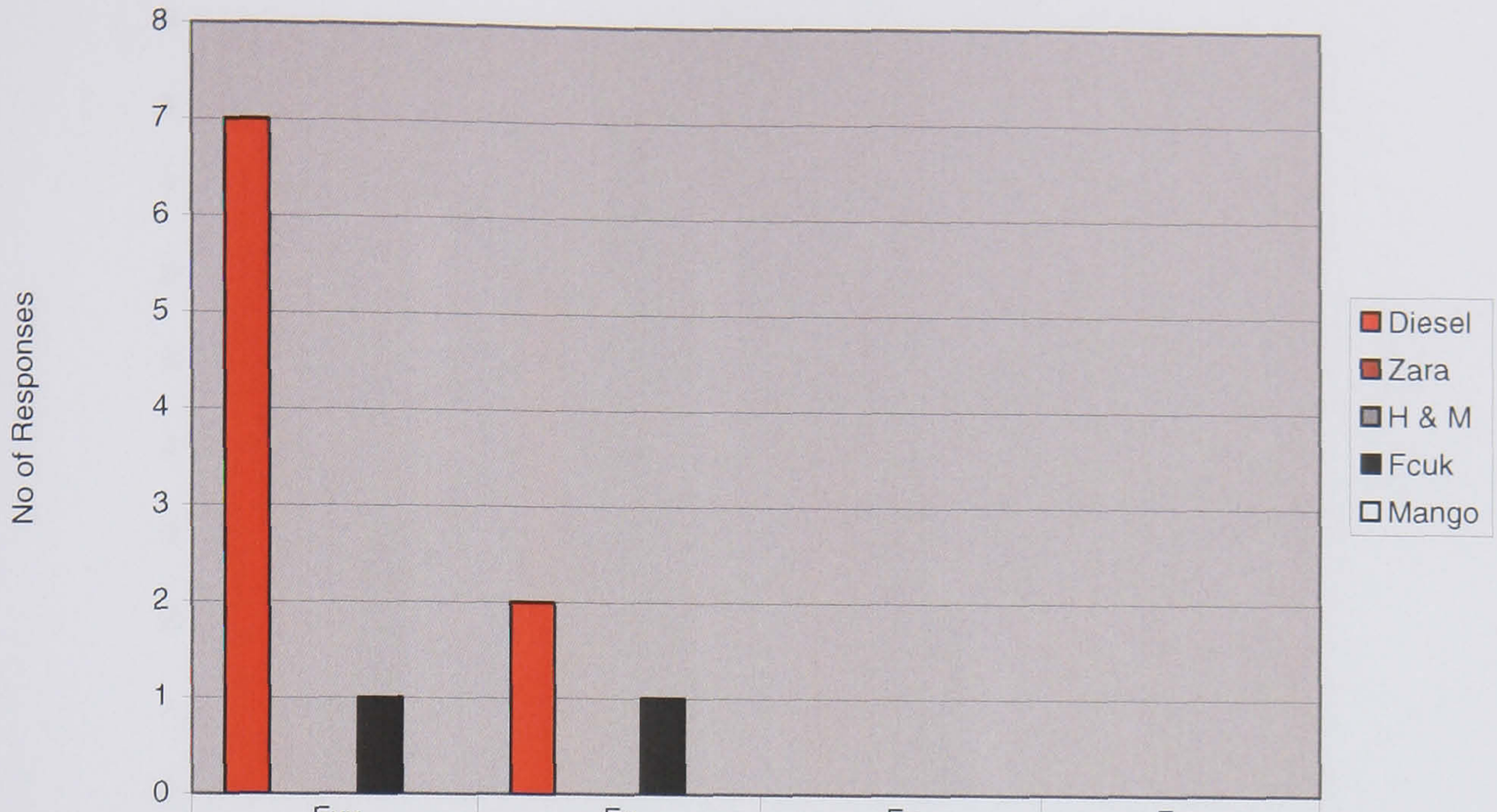
	Points
Diesel	7
Zara	2
H & M	0
Fcuk	0
Mango	0

Figure 5.6 the results of factor E-sound for the fashion group

Factor F-Animation

Figure 5.7 shows the values for animations. The best website was Diesel. The second was Fcuk. Of these five fashion websites, only Mango did not have any animation. On the Mango website, the designers only used Flash to design their menu page. On the Diesel website, the participants felt excited by the old movies and visual effects which used animation. Many new visual effects could be found by watching the animations and pages at Diesel.

The Diesel animation effects are worth discussing further because this website had the best design style performance in the EPs results.



	Fxx	Fx	Fy	Fyy
Diesel	7	2	0	0
Zara	0	0	0	0
H & M	0	0	0	0
Fcuk	1	1	0	0
Mango	0	0	0	0

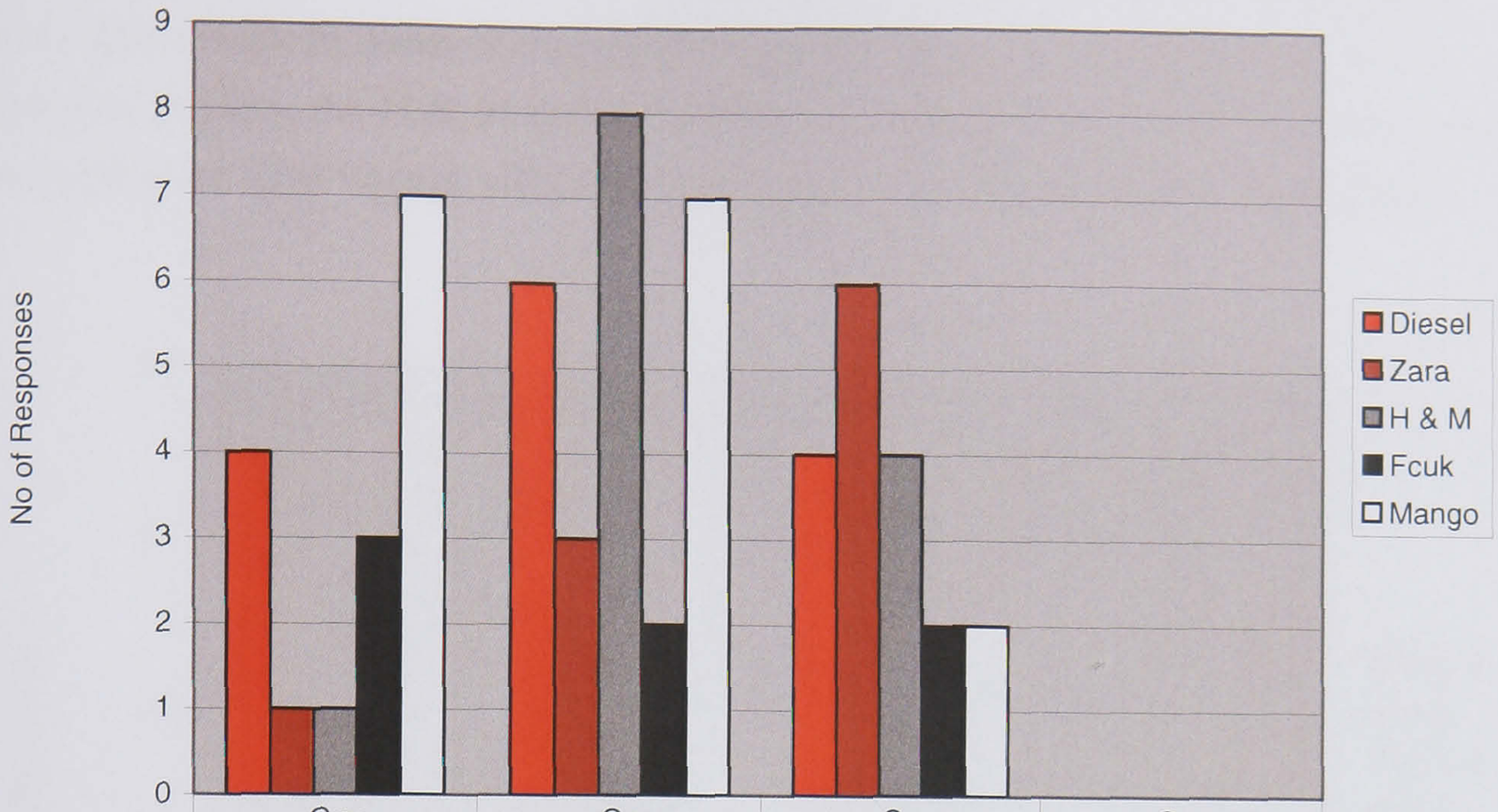
	Points
Diesel	16
Zara	0
H & M	0
Fcuk	3
Mango	0

Figure 5.7 the results of factor F-animation for the fashion group

Factor G-Emotion

In the fashion group, many participants' opinions focused on emotion. Sixty broken sentences from the participants related to their emotional response to this test. Figure 5.8 shows the results for emotion of this group. The best website in terms of emotion was Mango, followed by Diesel, H & M, and Fcuk. The worst website in this area was Zara.

In this section, the participants' opinions show that emotion plays a key point in website design. Regarding this factor, the results show forty-two positive emotional responses and eighteen negative emotional responses.



	Gxx	Gx	Gy	Gyy
Diesel	4	6	4	0
Zara	1	3	6	0
H & M	1	8	4	0
Fcuk	3	2	2	0
Mango	7	7	2	0

	Points
Diesel	10
Zara	-1
H & M	6
Fcuk	6
Mango	19

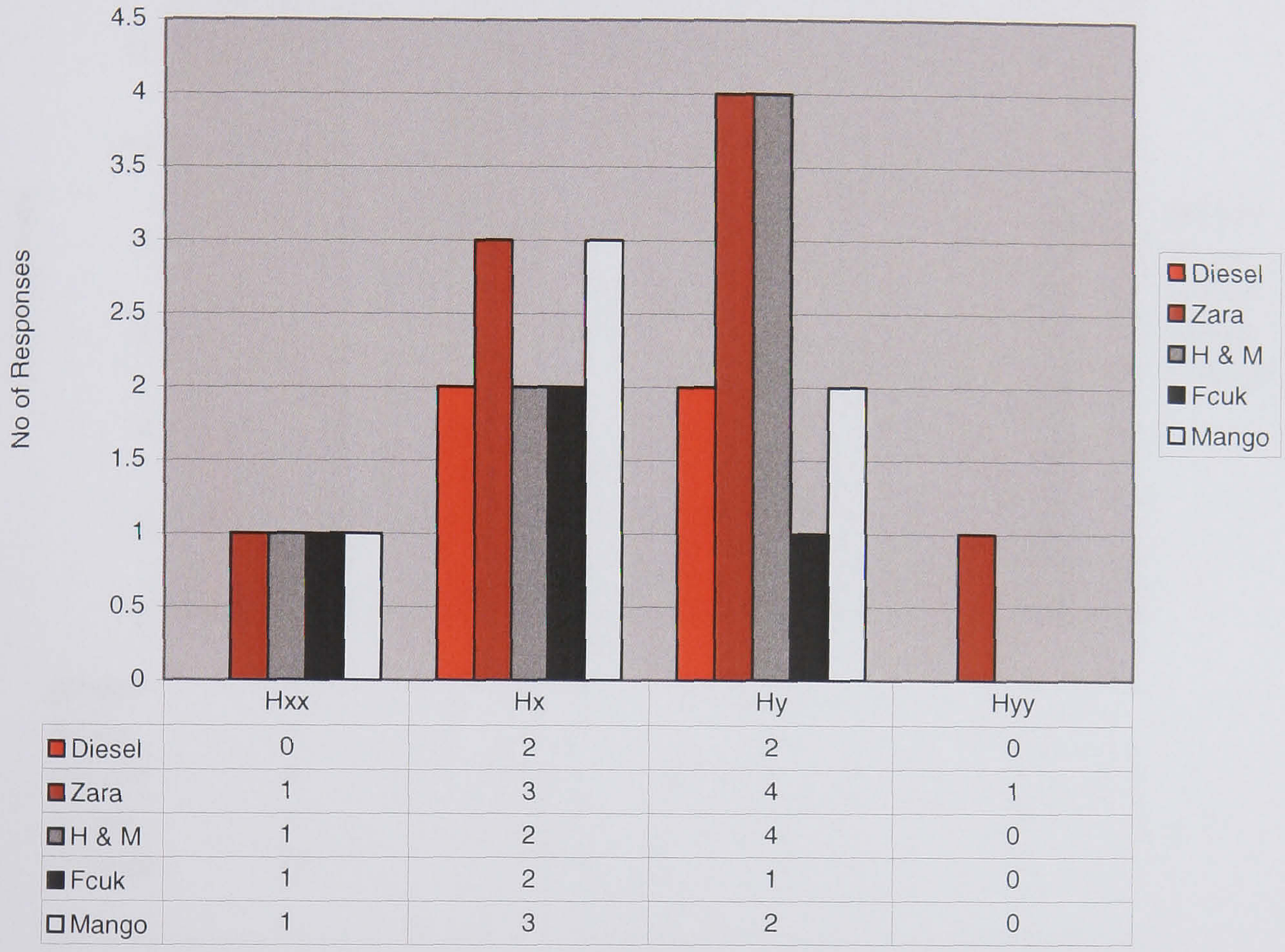
Figure 5.8 the results of factor G-emotion for the fashion group

Factor H-Colour

Figure 5.9 shows the values recorded for the colour codes and a bar chart for the fashion group. According to the participants' opinions, this factor also plays a key role in website design. Regarding this factor, the results show sixteen positive responses and fourteen negative ones from the participants. The best website in terms of colour use was Mango and Fcuk, followed by H & M and Diesel. The worst website was Zara.

Designers used a black and white colour scheme for the Mango website. In addition, the Fcuk website also used this black and white colour scheme. According to the results of EPs testing and the results of the questionnaires, the best websites in terms

of colour use had the same results as the questionnaires section. Diesel and H & M had similar results in terms of the positive and negative opinions about colour use. In the test process, the H & M website changed the main colour of the welcome page into flash pink. This change elicited many negative opinions from the participants.



	Hxx	Hx	Hy	Hyy
Diesel	0	2	2	0
Zara	1	3	4	1
H & M	1	2	4	0
Fcuk	1	2	1	0
Mango	1	3	2	0

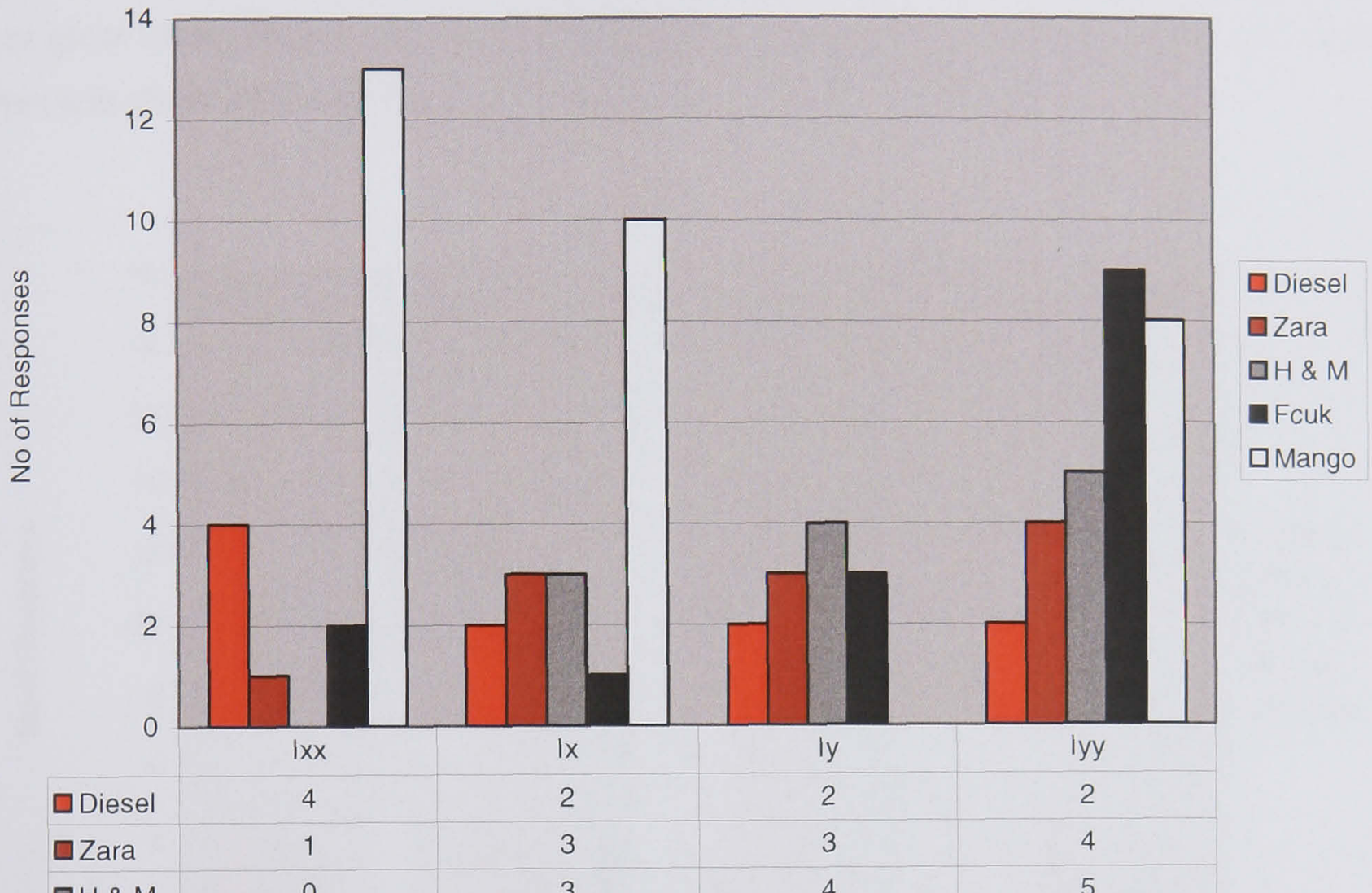
	Points
Diesel	0
Zara	-1
H&M	0
Fcuk	3
Mango	3

Figure 5.9 the results of factor H-colour for the fashion group

Factor I-Readability

Figure 5.10 shows the values recorded for the readability codes and a bar chart for the fashion group. Regarding this factor, the best website was Mango, followed by Diesel, and the worst website was Fcuk. The design problem regarding readability could be related to the size of the fonts and images. On the Mango website, the designers supply clear images and proper font sizes for the users. The participants felt satisfied

with its readability. Many participants stated that, even though the images were small, they were clear. The better readability of Mango supplied positive emotions for the participants.



	Ixx	Ix	Iy	Iyy
Diesel	4	2	2	2
Zara	1	3	3	4
H & M	0	3	4	5
Fcuk	2	1	3	9
Mango	13	10	0	8

	Points
Diesel	4
Zara	-6
H&M	-11
Fcuk	-16
Mango	20

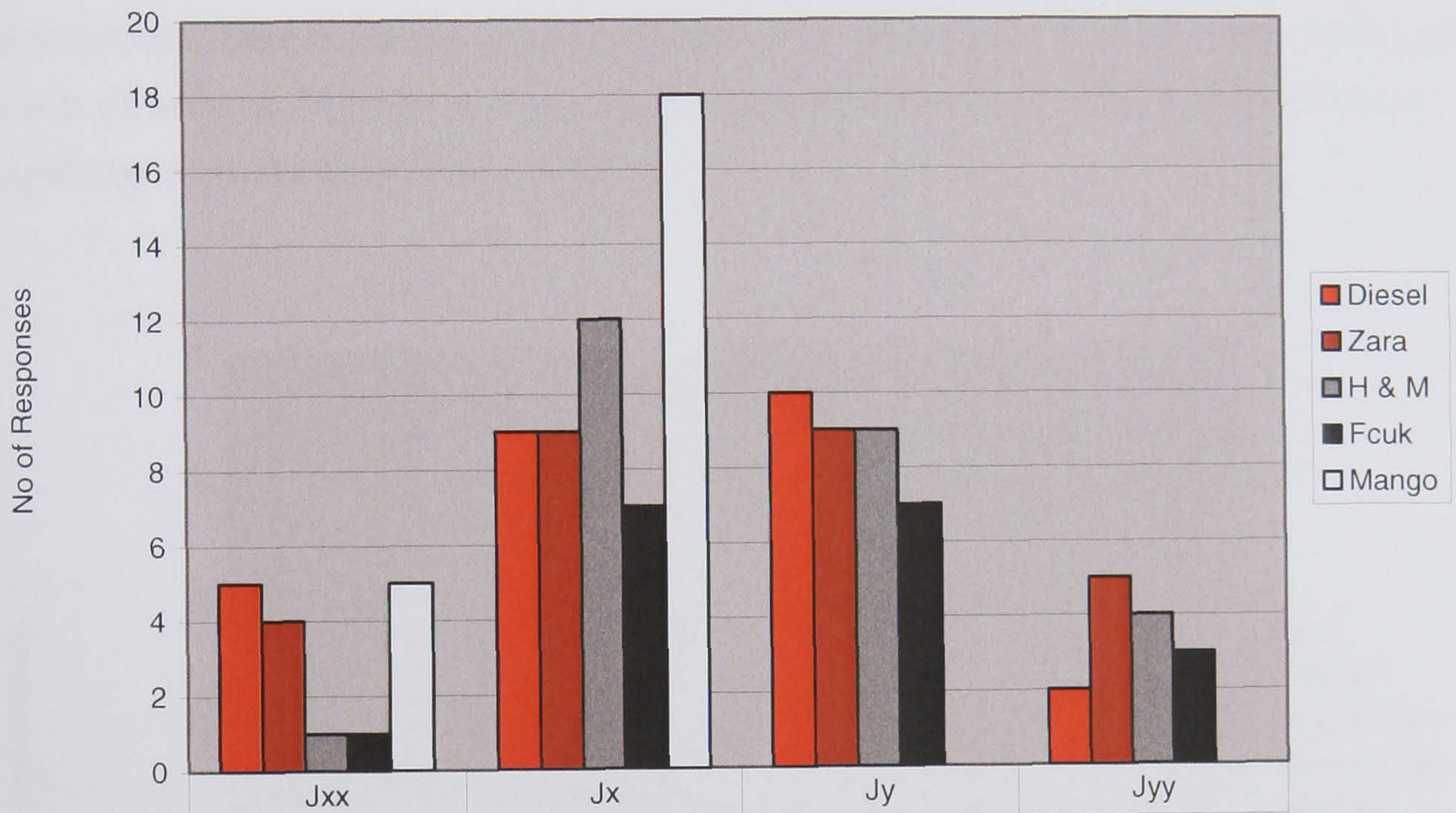
Figure 5.10 the results of factor I-readability for the fashion group

Factor J-Content

Figure 5.11 shows the values recorded for the content codes and a bar chart for the fashion group. The best website was Mango, followed by Diesel, Zara, and H & M, and finally Fcuk.

The classifications in Mango were limited edition, season collection, MNG jeans, accessories, models, photo gallery, extras, and fragrance. At each content page,

Mango supplied efficient information and images for users. Some participants declared that the Mango website supplied enough shopping information and product information. In addition, Diesel supplied the best visual performance for the contents because this website had the best performance in design style. Some participants thought that Fcuk with fashion on line videos and H & M with the changing room were great ideas. Regarding this factor, the Diesel website used many stunning effects to present their web content.



	Jxx	Jx	Jy	Jyy
Diesel	5	9	10	2
Zara	4	9	9	5
H & M	1	12	9	4
Fcuk	1	7	7	3
Mango	5	18	0	0

	Points
Diesel	5
Zara	-2
H & M	-3
Fcuk	-4
Mango	28

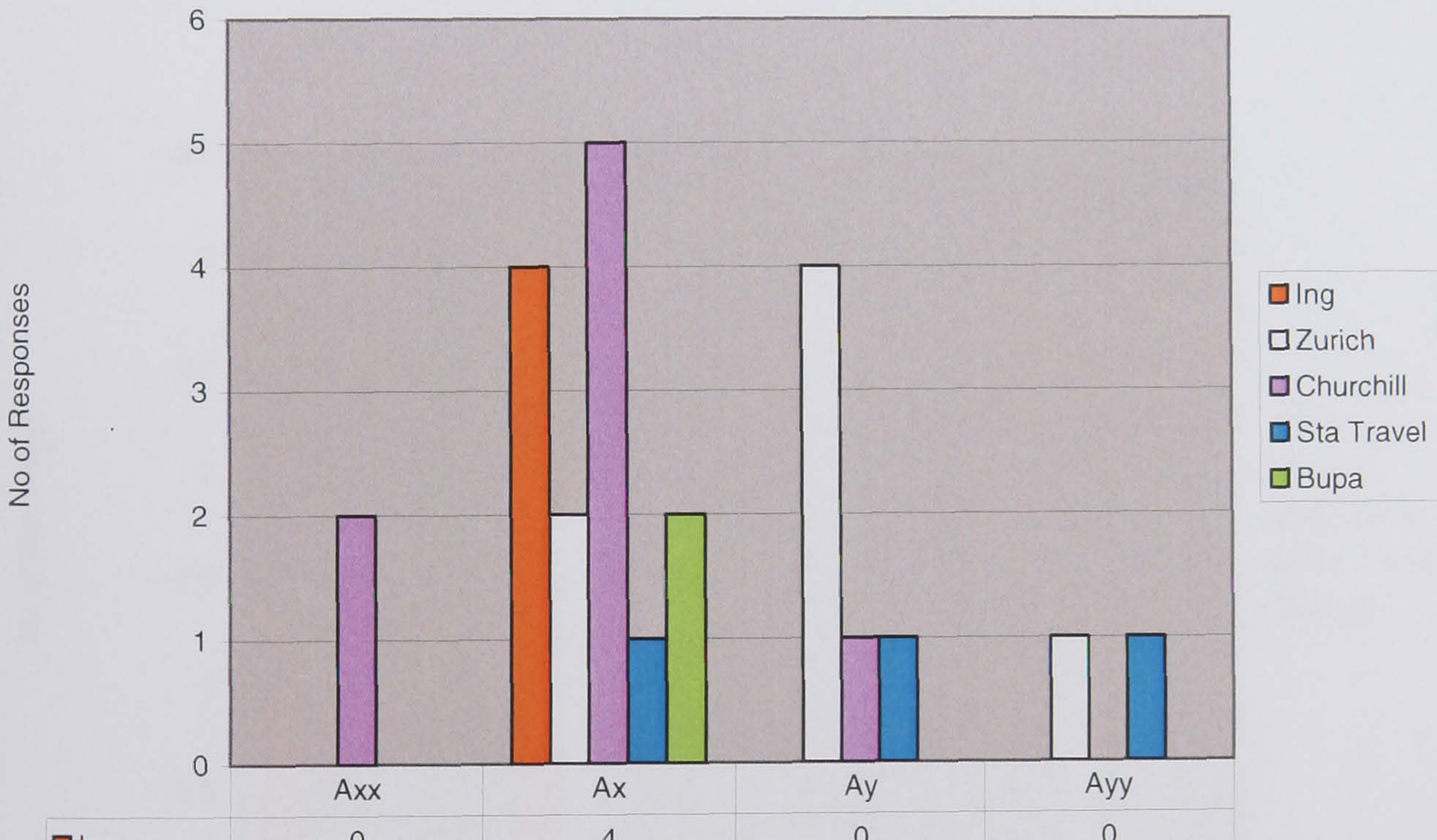
Figure 5.11 the results of factor J-content for the fashion group

5.3.2 The insurance group

Factor A-Navigation

Figure 5.12 shows the values recorded for the navigation codes and a bar chart for the insurance group. The best website was Churchill, followed by Ing, then Bupa and Sta Travel. The worst website in terms of this factor was Zurich.

Designers set the top menu, which was classified into seven main parts on the Churchill website. By using different font sizes and colours to distinguish these links, it was easy for users to understand clearly about the web structure. In addition, the site map was also designed to deal with a great amount of information that could easily help users when surfing. Navigation with regard to website design contains two characteristics. One is for the target audience. The other is for general users. Although this sort of website belongs to a special market for consumers, the five test websites' navigations were designed for general users.



	Axx	Ax	Ay	Ayy
Ing	0	4	0	0
Zurich	0	2	4	1
Churchill	2	5	1	0
Sta Travel	0	1	1	1
Bupa	0	2	0	0

	Points
Ing	4
Zurich	-4
Churchill	8
Sta Travel	-2
Bupa	2

Figure 5.12 the results of factor A-navigation for the insurance group

Factor B-Loading Time

Figure 5.13 shows the values recorded for the loading time codes and a bar chart for the insurance group. The best websites regarding loading time was Bupa. Many possible factors may influence loading time. This point has been discussed previously with reference to the fashion group. Many participants declared that loading time was very important for them to see the website continuously or not in the life. Even though surfing test websites, the participants felt annoyed about slow loading time. On average, the participants did not spend more than five minutes surfing each website in the test process. The important fact was that many participants could not wait for websites with a slow loading speed in the test process. However, what kind of loading speed can meet the requirements of the users? This point is very important in website test processes, even after the launch stage.

	Bxx	Bx	By	Byy
Ing	1	2	0	0
Zurich	0	2	0	1
Churchill	0	1	1	0
Sta Travel	0	0	0	0
Bupa	3	0	0	0

	Points
Ing	4
Zurich	0
Churchill	0
Sta Travel	0

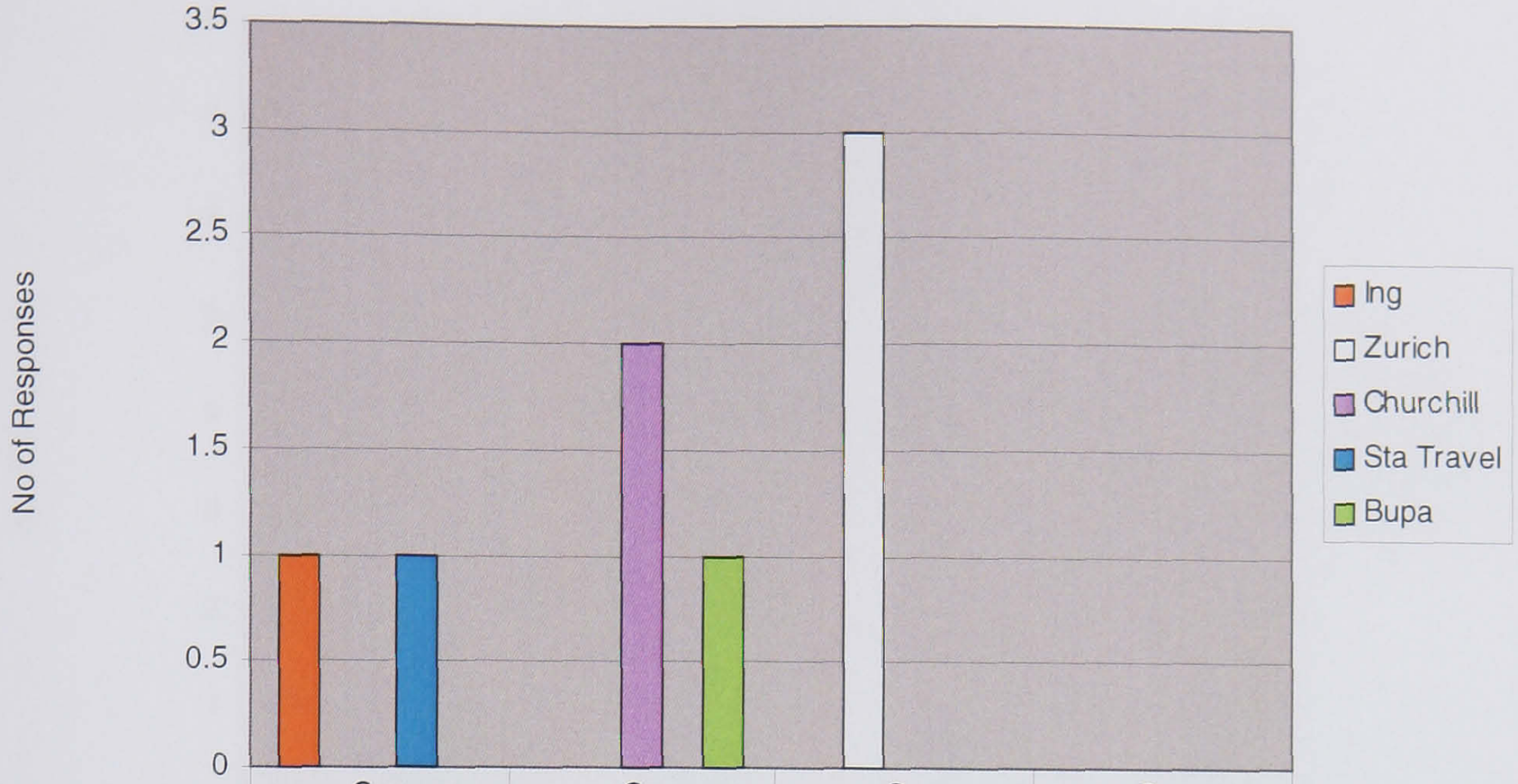
Bupa	6

Figure 5.13 the results of factor B-loading time for the insurance group

Factor C-Links

Figure 5.14 shows the values recorded for the links codes and a bar chart for the insurance group. The better websites were Ing, Churchill, and Sta Travel. The worst website was Zurich. The main design problem with the Zurich website is the failure to distinguish between internal and external links for users. The participants felt confused in the test processes by the links problems. Although the Zurich website supplied the most simple and contemporary interface for users, the link problem resulted from unsuitable website classifications and differences in setting the links functions. The links texts, title texts, and content texts should be designed well for users in order to supply better accessibility for scamming.

A very popular design method used for links is that of a site map. This method is used mainly to deal with big websites of which the users cannot easily search the target page. Using a site map can supply more titles than the welcome page for users to search web contents. One participant gave a useful opinion about this point. “Why not design a site map using real images?” This suggestion is worth further consideration. Comparing the navigation of the welcome page, search functions, and a site map, what kind of navigation can enhance accessibility in web design in the future development?



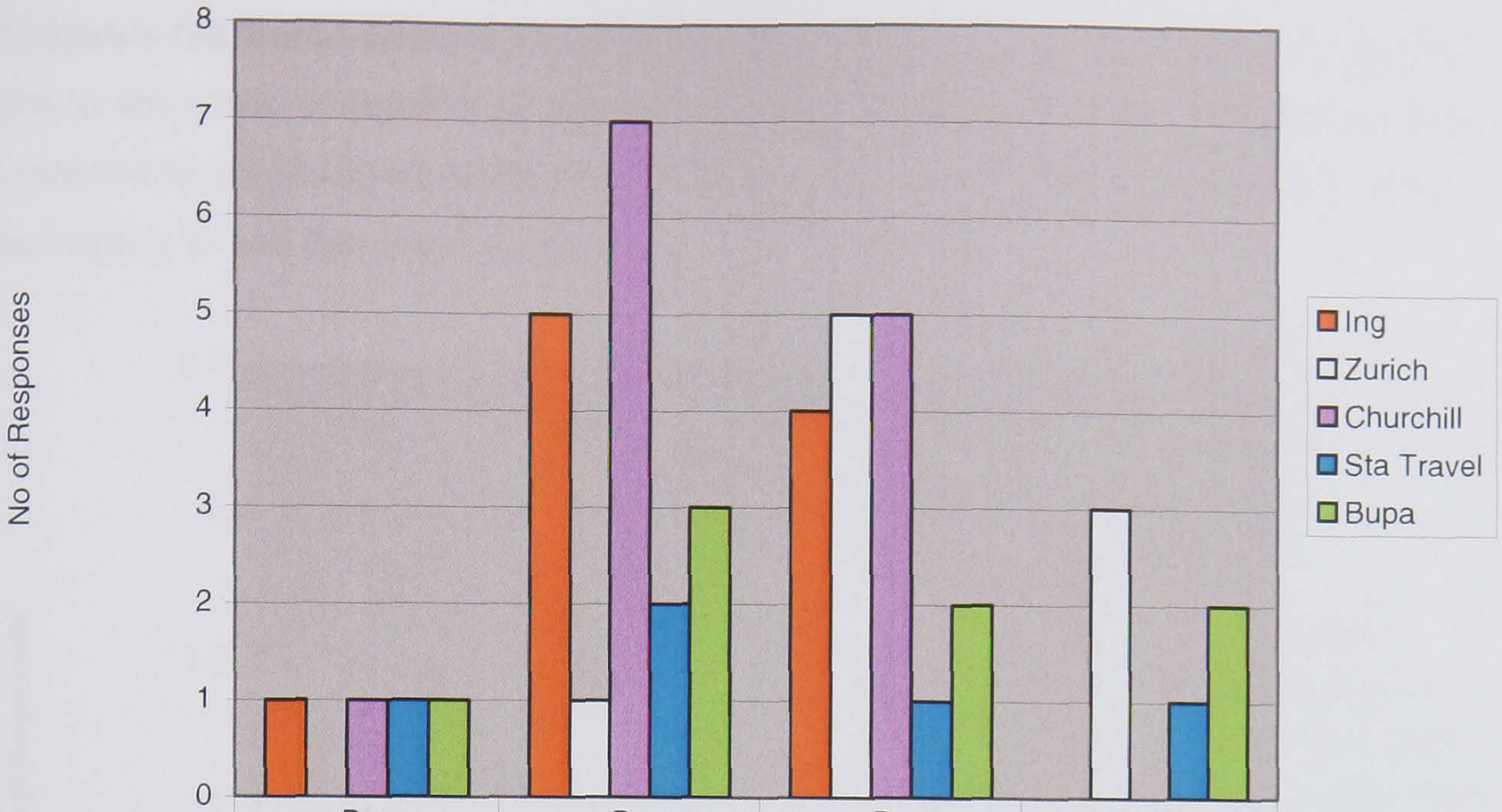
	Cxx	Cx	Cy	Cyy
Ing	1	0	0	0
Zurich	0	0	3	0
Churchill	0	2	0	0
Sta Travel	1	0	0	0
Bupa	0	1	0	0

	Points
Ing	2
Zurich	-3
Churchill	2
Sta Travel	2
Bupa	1

Figure 5.14 the results of factor C-links for the insurance group

Factor D-Interface

Figure 5.15 shows the values recorded for the interface codes and a bar chart for the insurance group. The best website for interface performance was Churchill. The worst website was Zurich. For this factor, the interface covered web layouts and interface functions. The latter are particularly different in terms of graphic design. In addition, many factors relating to both hardware and software will strongly influence the performances of the interface. This point was discussed in the literature review.



	Dxx	Dx	Dy	Dyy
Ing	1	5	4	0
Zurich	0	1	5	3
Churchill	1	7	5	0
Sta Travel	1	2	1	1
Bupa	1	3	2	2

	Points
Ing	3
Zurich	-10
Churchill	4
Sta Travel	1
Bupa	-1

Figure 5.15 the results of factor D-interface for the insurance group

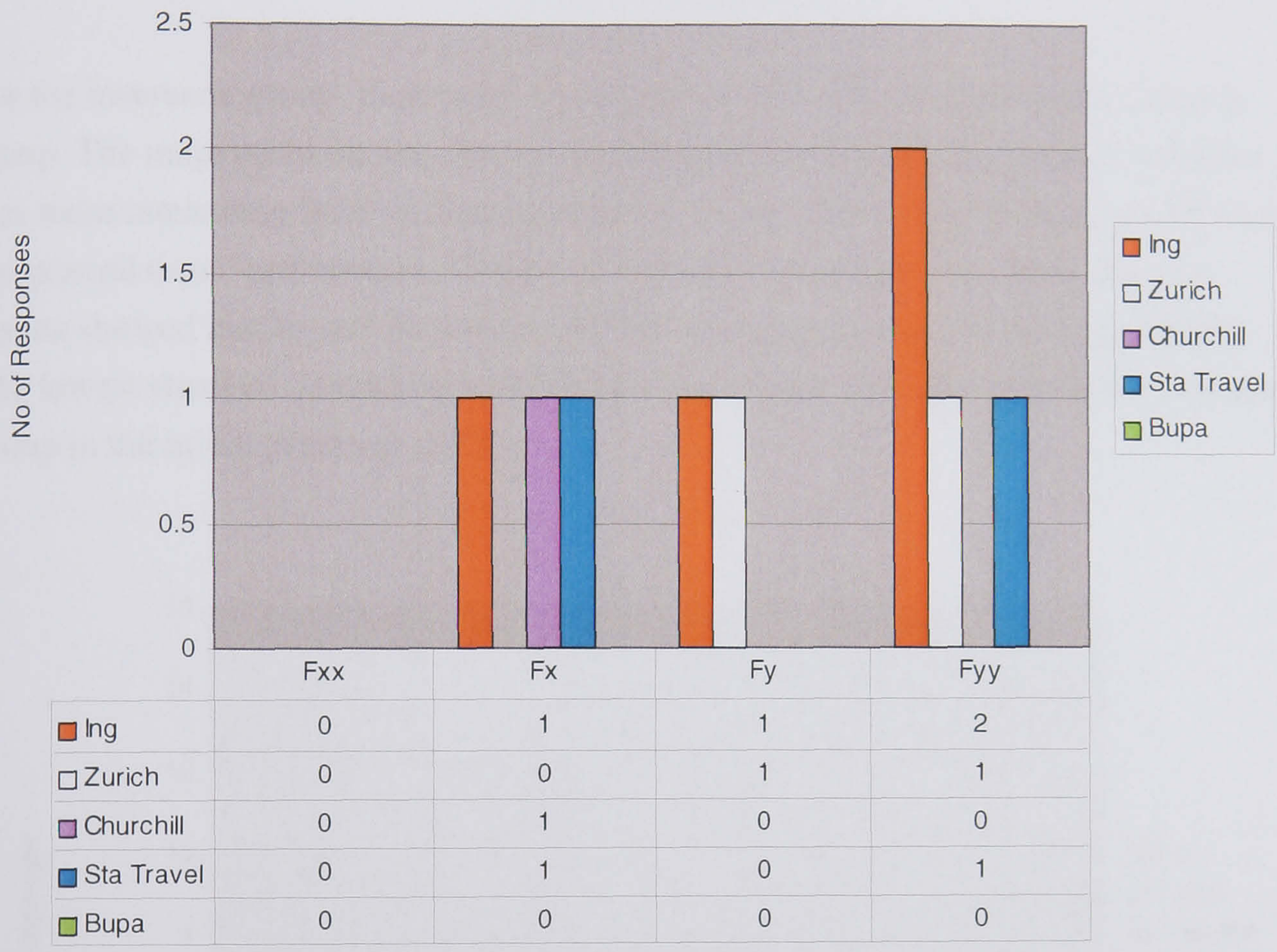
Factor E-Sound

There was no sound function for the insurance group. This factor can not be discussed for the insurance group.

Factor F-Animation

Figure 5.16 shows the values recorded for the animation codes and a bar chart for the insurance group. There was no special animation design for the insurance group. No online videos or animations were included on these five test websites. The designers designed a worldwide travel flash for the Sta Travel website. Moreover, a jumping orange ball was designed for the Ing website. Zurich, Churchill, and Bupa had no

animation design, but designed their interfaces in flash. In the test processes, many participants felt bored when surfing these test websites. Their opinions showed their desire to see some animation design in these three websites. Many of the participants felt interested about the nodding dog which is shown on the Churchill website and were hoping to see this logo animated.



	Fxx	Fx	Fy	Fyy
Ing	0	1	1	2
Zurich	0	0	1	1
Churchill	0	1	0	0
Sta Travel	0	1	0	1
Bupa	0	0	0	0

	Points
Ing	-4
Zurich	-3
Churchill	1
Sta Travel	-1
Bupa	0

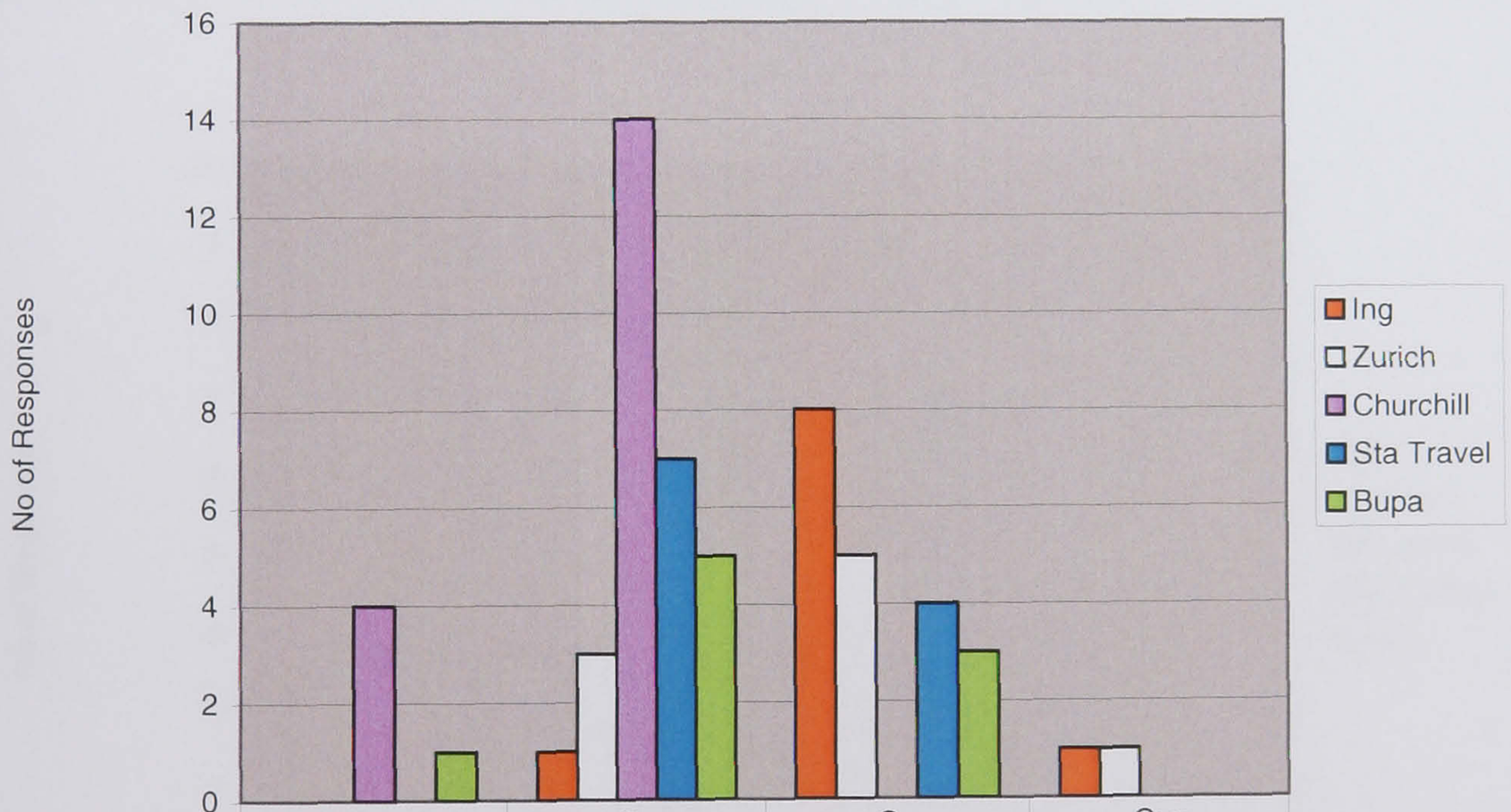
Figure 5.16 the results of factor F-animation for the insurance group

Factor G-Emotion

Figure 5.17 shows the values recorded for the emotion codes and a bar chart for the insurance group. For this factor, the best website was Churchill. The worst website was Ing because many of the participants stated that it contained too much text and a very bad animation. Participants in the test process often declared this problem. In this group, emotional problems mainly resulted from usability; this result is different from

that of the fashion group. The evidence can be compared and discussed from the participants' opinions. For the fashion group, many emotional problems were caused by the participants' direct like or dislike. If the user's emotional response resulted from usability, this design problem can be improved by enhancing usability. If not, the emotional response should be discussed in the contents field. The important questions are what should be provided and how can it be provided.

For the insurance group, there were fewer emotional problems than for the fashion group. The main problem was that the participants felt that surfing fashion websites was more interesting than visiting insurance websites. This phenomenon results from the general users' preferences. Compared with the initial pilot test (IPT), the test results showed that to surf insurance websites was very boring for the participants. The lowest standard deviations with lower mean values also appeared in the insurance group in the initial pilot test (I.P.T.).



	Gxx	Gx	Gy	Gyy
Ing	0	1	8	1
Zurich	0	3	5	1
Churchill	4	14	0	0
Sta Travel	0	7	4	0
Bupa	1	5	3	0

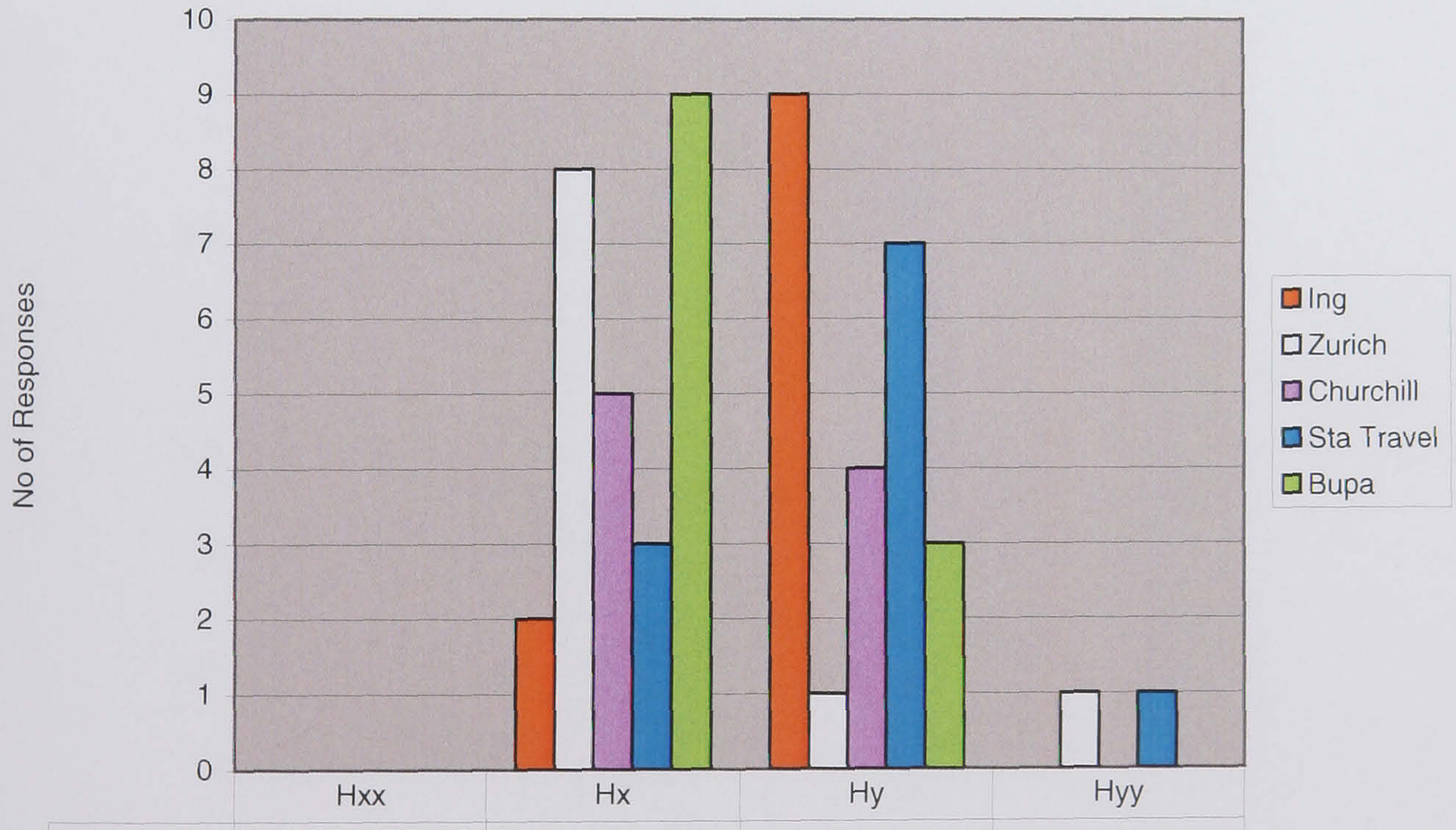
	Points
Ing	-9
Zurich	-4
Churchill	22
Sta Travel	3

Bupa	4

Figure 5.17 the results of factor G-emotion for the insurance group

Factor H-Colour

From factor H to K, these four factors have strong performances for the insurance group. This fact means that many participants' opinions are related to these four factors. Figure 5.18 shows the values recorded for the colour codes and a bar chart for the insurance group. The best websites in terms of colour use was Bupa. The worse websites was Ing. Bupa used white and flash blue for its colour scheme. Similar colour use caused a problem for Ing and Sta Travel. The former used too many flash colours on their pages. In addition, Sta Travel did not use any highlight colour, which made scanning difficult. For this group, there were more design problems regarding colour than for the fashion group. Comparing the results of the participants' protocol data and the results of EPs testing in terms of colour, the colour factor caused many negative emotions for the participants in the insurance group.



	Hxx	Hx	Hy	Hyy
Ing	0	2	9	0
Zurich	0	8	1	1
Churchill	0	5	4	0
Sta Travel	0	3	7	1
Bupa	0	9	3	0

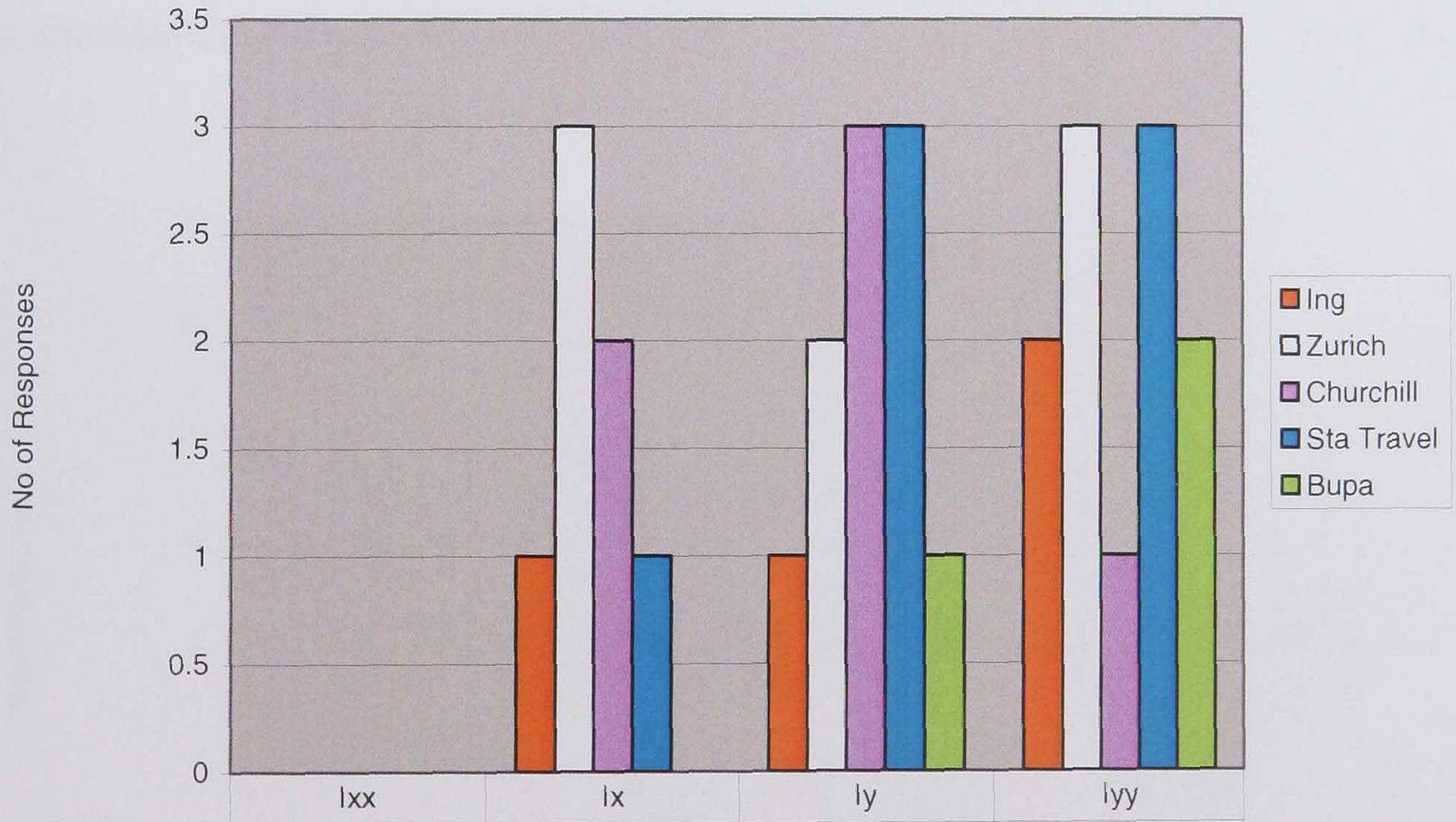
	Points
Ing	-7
Zurich	5

Churchill	1
Sta Travel	-6
Bupa	6

Figure 5.18 the results of factor H-colour for the insurance group

Factor I-Readability

For the insurance group, readability was a big design problem for the participants. Many participants argued that there was too much text with bad readability on the insurance websites during the test process. Figure 5.19 shows the values recorded for the readability codes and a bar chart for the insurance group. The five insurance websites had design problems in terms of their readability. The general problem was the font sizes. In addition, some interfaces were too crowded for users, which also influenced readability. Finally, many participants complained about Zurich's unclear images. For this factor, there was no especially good website for the insurance group. For this group, the problem of readability strongly influenced accessibility.



Ing	0	1	1	2
Zurich	0	3	2	3
Churchill	0	2	3	1
Sta Travel	0	1	3	3
Bupa	0	0	1	2

	Points
Ing	-4
Zurich	-5

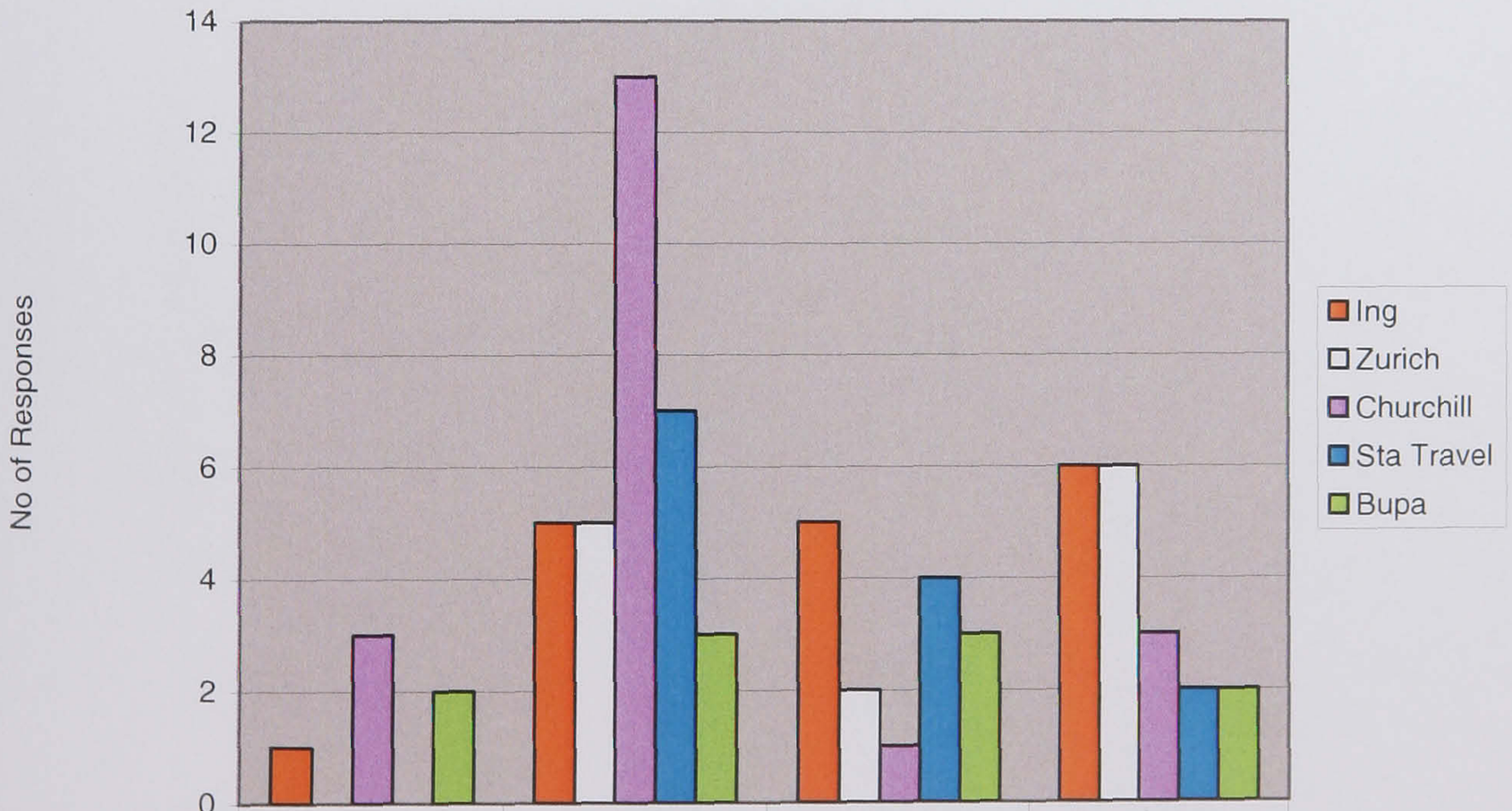
Churchill	-3
Sta Travel	-8
Bupa	-5

Figure 5.19 the results of factor I-readability for the insurance group

Factor J-Content

The general problem about the contents for the insurance group was too much text. In addition, this sort of website had no charming points for the participants. According to the participants' opinions, the best way was for the participants to discuss their insurance details with the sellers face by face. At least, users look forward to seeing that efficient contact methods were clearly shown on the insurance website.

Figure 5.20 shows the values recorded for the content codes and a bar chart for the insurance group. The best website for this factor was Churchill. The worse websites were Ing and Zurich. The Ing website did not supply enough and efficient information for making contact. For the Zurich website, it was difficult for users to find information from this website. The Sta Travel website supplied a good web classification for users on the welcome page.



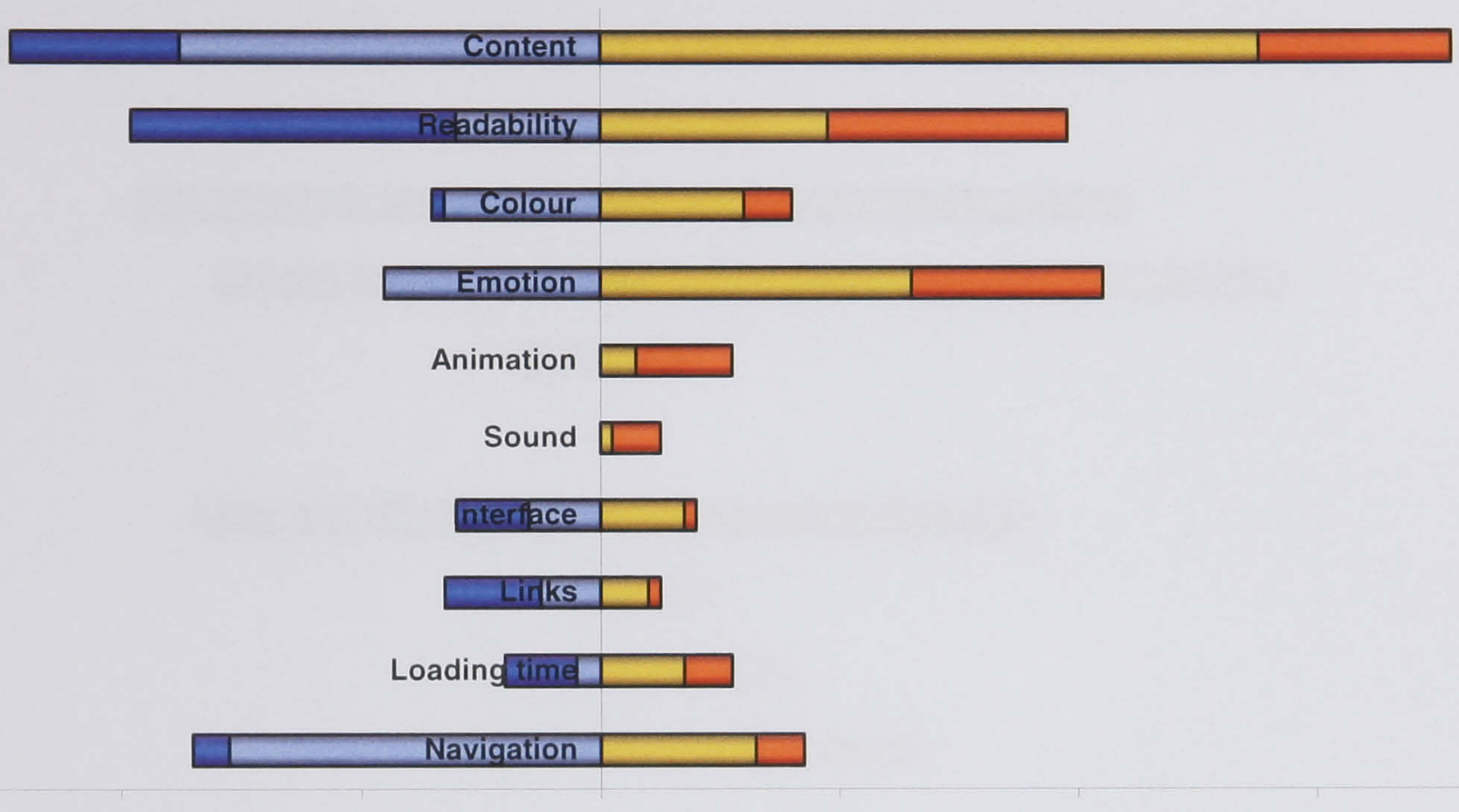
	Jxx	Jx	Jy	Jyy
Ing	1	5	5	6
Zurich	0	5	2	6
Churchill	3	13	1	3
Sta Travel	0	7	4	2
Bupa	2	3	3	2

	Points
Ing	-10
Zurich	-9
Churchill	12
Sta Travel	-1
Bupa	

Figure 5.20 the results of factor J-content for the insurance group

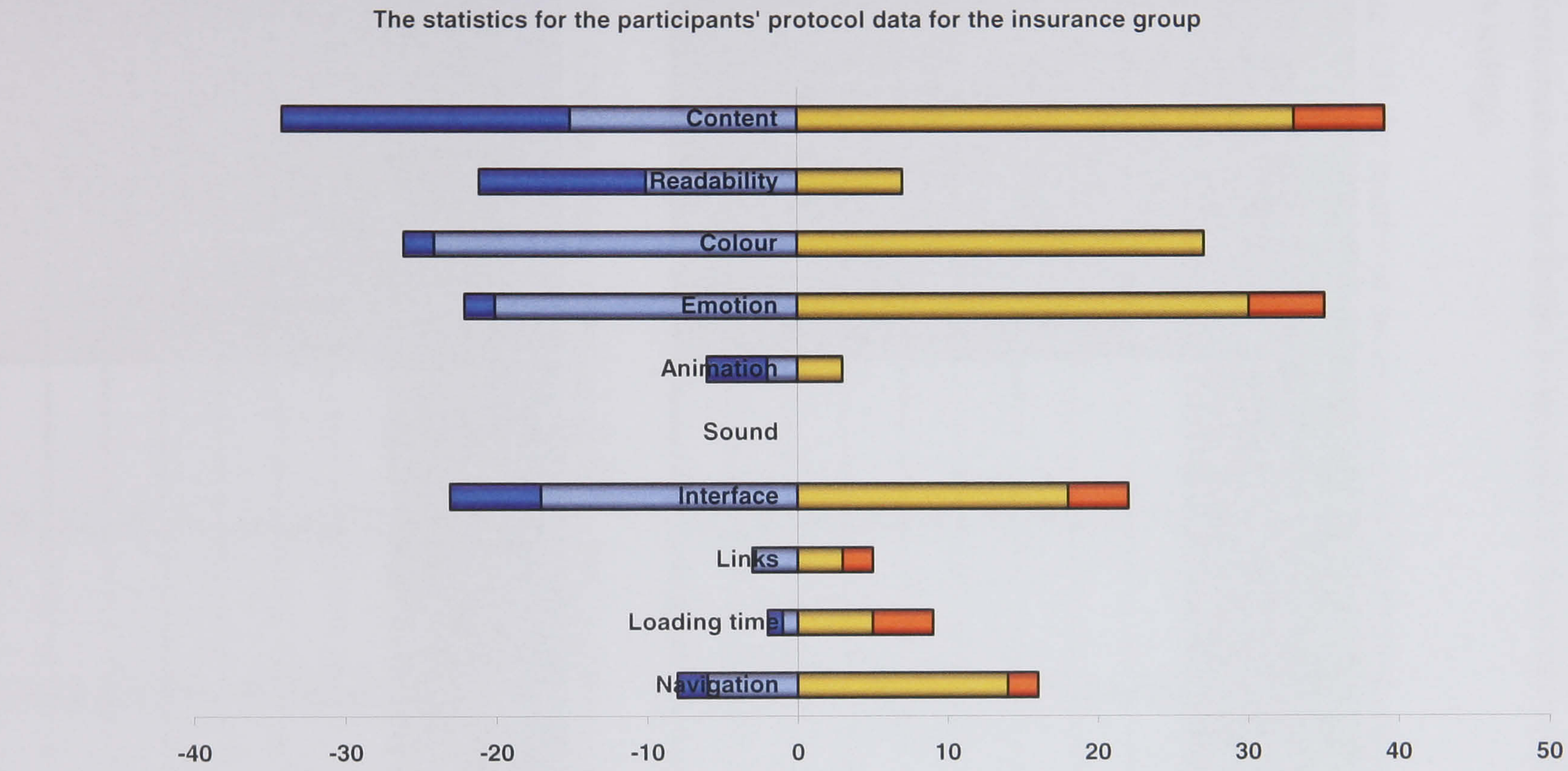
To sum up the results of the participants' protocol data, figure 5.21 and figure 5.22 show the statistics for the protocol data for each group. Personal comments are disregarded in this study. On the one hand, for the fashion group, the order of the factors, from high to low is content, readability, emotion, navigation, colour, interface, loading time, links, animation, and sound but this is because only two sites used sounds. On the other hand, for the insurance group, the order of the factors from high to low is content, emotion, colour, interface, readability, navigation, loading time, animation, links, and sound but this is because no insurance site used sound.

Comparing both test groups, content and emotion play very important roles in this research. The results of the participants' opinions will supply important information for creating the website design reference model.



	Navigation	Loading time	Links	Interface	Sound	Animation	Emotion	Colour	Readability	Content
Very negative	-3	-6	-8	-6	0	0	0	-1	-27	-14
Negative	-31	-2	-5	-6	0	0	-18	-13	-12	-35
Very positive	4	4	1	1	4	8	16	4	20	16
Positive	13	7	4	7	1	3	26	12	19	55

Figure 5.21 the fashion group statistics for protocol data



	Navigation	Loading time	Links	Interface	Sound	Animation	Emotion	Colour	Readability	Content
Very negative	-2	-1	0	-6	0	-4	-2	-2	-11	-19
Negative	-6	-1	-3	-17	0	-2	-20	-24	-10	-15
Very positive	2	4	2	4	0	0	5	0	0	6
Positive	14	5	3	18	0	3	30	27	7	33

Figure 5.22 the insurance group statistics for protocol data

5.4 The results of Emotional Probes testing (EPs testing)

This section aims to discuss the relationship between design style and visible components. Using EPs testing and questionnaires, design style can be discussed in order to obtain more details about visible web factors. Individual results and performances can be found in appendix C-the results of Emotional Probes testing (EPs testing).

Table 5.23 the results of design style for the fashion group

Sort of Website: Fashion					
Design Style and Order/ Name of Website	Diesel	Zara	H & M	Fcuk	Mango
Very Strong	2	1	0	0	0
Strong	4	3	0	6	1
Fairly Strong	0	0	1	1	5
Average	1	4	4	2	2
Fairly Weak	1	2	3	0	0
Weak	1	0	1	0	0
Very Weak	0	0	1	1	2
None	1	0	0	0	0
Order	1	4	5	2	3

Table 5.24 the results of design style for the insurance group

Sort of Website: Insurance					
Design Style and Order/ Name of Website	Ing	Zurich	Churchill	Sta Travel	Bupa
Very Strong	0	0	0	0	0
Strong	5	0	2	0	2
Fairly Strong	3	4	1	4	3
Average	2	3	2	1	1
Fairly Weak	0	1	1	0	0
Weak	0	0	2	3	1
Very Weak	0	2	0	2	3
None	0	0	2	0	0
Order	1	4	3	5	2

The web visible components consisted of colours, lines, shapes, textures, fonts, and

texts. In the individual sections, each factor was assigned in several codes. This method aims to compare the relationship between the participant created mood board and visual design of the commercial websites. These basic factors were compared site by site by the participants in each group. Table 5.23 shows the results of the design style for the fashion group. The order of performances from high to low was Diesel, Fcuk, Mango, Zara, and H & M. Table 5.24 shows the results of design style performances for the insurance group. The order of design style performances from high to low was Ing, Bupa, Churchill, Zurich, and Sta Travel.

5.4.1 The fashion group

Table 5.25 shows the fashion group statistics for design style, interface, colour, and layout. The order of design style results from the mood boards of EPs' results. The orders of interface, colour, and animation are based on the results of the participants' protocol data. The other three are use of colour, use of layout, and animation based on the results of questionnaires. Comparing the results from part one-the results of the participants' protocol data and part three-the results of questionnaires, the orders of each design factor are very similar but not the same. The reason for this is that the participants did not mention all of their opinions about each design factor in the first part of the test but they need to tick all choices for every factor in the third part of the test. It is more reasonable to take the order of the factors from part three-the results of questionnaires in order to discuss the better performances of the test website for each design factor. This will be discussed below.

Table 5.25 the fashion group statistics for design style, interface, colour, and layout

Sort of Website: Fashion					
Data Sources, Factors/ Name of Website	Diesel	Zara	H & M	Fcuk	Mango
Part 2: Design Style	1	4	5	2	3
Part 1: Interface	5	2	3	4	1
Part 1: Colour	2	3	2	1	1
Part 1: Animation	1	3	3	2	3
Part 3: Interface (Mean Value/ SD)	2.4 0.966	3.8 1.135	3.7 0.823	3.9 0.568	4.5 0.849
Part 3: Interface	5	3	4	2	1
Part 3: Use of Colour (Mean Value/ SD)	3.6 1.506	3.7 1.418	3.3 1.418	3.6 1.075	4.1 1.197
Part 3: Use of Colour	4	2	5	3	1
Part 3: Use of Layout (Mean Value/ SD)	3.8 1.033	3.1 1.37	3 1.333	3.6 0.699	4.2 0.919
Part 3: Use of Layout	2	4	5	3	1
Part 3: Animation (Mean Value/ SD)	3.9 1.524	3.2 1.317	3 1.414	3.5 1.08	2.9 0.994
Part 3: Animation	1	3	4	2	5

The EPs results can supply the details about colour and interface. The participants' choices in this part helped the author to consider the influences of colour and interface.

The Diesel website

The Diesel website had the best performance in terms of design style. In the colours selection, the important web colours are black and white. The important lines are horizontal and vertical lines. For the shapes' selection, the important shape is the square. The important types of texture are rough, soft, and hard structures. The font is Arial. For the text selection, the important text is coloured for the participants.

In general, the participants' impressions are the same as the performance of the visual factors for the Diesel website. There was a stronger influence appearing in terms of colours, lines, and texture on the Diesel website. Diesel had the best performance in terms of design style because its colour use, the performance of web quality, and animation strongly influence the participants' impressions. In particular, the influence

of animation on the design style and the similar phenomena also appeared for the insurance group in this study. The difference is that this influence is a sort of positive influence on the fashion group but a negative one on the insurance group. The evidences appear in above tables 5.25 and 5.26.

The Zara website

The Zara website was the fourth performer in terms of design style. The important web colours for the participants are white, green, and brown. The important lines are horizontal, vertical, random, and grid lines. The important shape is the square. For the texture impression selection, the impression is plain and hard structures. The fonts are Arial and Georgia. For the text selection, the participants' impression about the texts is italicized text.

The Zara website did not perform better in design style. The main reason appears in its colour use and animation, especial in the performance of the animation. Animation design in web design can create a series of temple on pages. This effect is very different from the traditional concepts of graphic design. Diesel designers controlled well this design factor. In the test process, many participants were excited and surprised by these new effects of graphics and animation on the Diesel website.

The H & M website

The H & M website had the worst performance in terms of design style. For the colour selection, the important colours for the participants are white, blue, yellow, and red. The important line is horizontal lines. The important shape is the square. For texture selection, the important texture is soft structures. The important font is Arial. Finally, the participants' impression about the texts is coloured text.

The H & M website had changed its welcome page colour to flash pink. Many of the participants argued about this point during the test process. This change caused a very negative impression for three participants. Compared with other test websites in the fashion group, H & M had the worst performances in terms of colour and interface. In addition, on the changing room page, the response time of the animation is very slow for the participants. Although the participants were interested in this animation at the initial stage, this design problem will soon change their decisions to look at other pages on this site.

The Fcuk website

The Fcuk website was the second performance of design style. For the colour selection, the participants have strong impressions of black and white. The important line is the horizontal line. The important shape is the square. Regarding texture selection, the participants have a strong impression of plain structures. The important fonts are Arial and Times. The text is italicized text.

The participants have an interest in online videos. Many of the participants think that the Fcuk website performs better in presenting fashion videos. The Fcuk website had better performance in colour use and animation. This situation is similar to the Diesel website because the influence of animation in the design style also appears on this site.

The Mango website

The Mango website was the third highest performer in terms of design style in the fashion group. Regarding colour selection, the participants have strong impressions of black and white. The important line is the horizontal line. Participants have a strong impression of squares. Regarding texture selection, the important sorts of texture are plain, hard, and tangible structures. The fonts impression are Arial, Times, and others. For the texts, many participants chose coloured text and capital letters.

The Mango website had the best performance in terms of colour use and interface. Its performance in terms of animation is lower than the other websites in the fashion group. This situation explains why to use the emotional probes testing for web design style cannot only be discussed in the graphic design field because the result may appear errors in the website design field. At the results of the emotional probes testing, the importance of animation appears in the results of Mango again.

5.4.2 The insurance group

Table 5.26 shows the insurance group statistics in terms of design style, interface, colour, and layout. The order of design style was based on the mood board of EPs results. The order of interface, colour, and animation resulted from the first part-the results of the participants' protocol data. The other three orders of use of colour, use of layout, and animation resulted from the third part-the results of questionnaires.

Table 5.26 the insurance group statistics for design style, interface, colour, and layout

Sort of Website: Insurance					
Data Sources, Factors/ Name of Website	Ing	Zurich	Churchill	Sta Travel	Bupa
Part 2: Design Style	1	4	3	5	2
Part 1: Interface	2	5	1	3	4
Part 1: Colour	5	2	3	4	1
Part 1: Animation	5	4	1	3	2
Part 3: Interface (Mean Value/ SD)	4.1 0.876	3 0.471	4.6 0.516	3.4 0.843	3.9 1.197
Part 3: Interface	2	5	1	4	3
Part 3: Use of Colour (Mean Value/ SD)	2.4 1.35	3.1 1.101	4.2 0.789	3.4 0.966	3.7 0.823
Part 3: Use of Colour	5	4	1	3	2
Part 3: Use of Layout (Mean Value/ SD)	2.9 1.287	2.8 0.919	4.1 0.876	3.3 0.949	3.6 1.075
Part 3: Use of Layout	4	5	1	3	2
Part 3: Animation (Mean Value/ SD)	2.9 1.101	3 0	3.6 0.966	3.1 0.316	3.3 0.675
Part 3: Animation	5	4	1	3	2

The Ing website

The Ing website had the best performance for design style in the insurance group. For colour selection, the participants have strong impressions of orange and blue. The important lines are horizontal and curved lines. The shape is the circle. Regarding texture selection, the participants have strong impressions of plain and soft structures. The important font is Arial. Regarding text selection, the participants have strong impressions of boldface text and coloured text.

Although the Ing website had the best performance in terms of design style, its interface, colour use, and animation are below the average performance for the insurance group. The evidence is based on the results of the participants' protocol data and the results of questionnaires. The question is why Ing can create the strongest impression for the participants but much evidence shows that this impression is very negative for the participants. The strong colour use and rough animation with a jumping ball on the screen can perhaps explain this result. During the test process, many participants argued about its colour use and animation many times. When

creating the mood board, the participants showed a negative impression of this board. This situation is very different from the fashion group.

Comparing the best website design style in the fashion group, the Diesel website did not have the best performance in terms of colour and interface, but it has the best performance in terms of animation for the fashion group, due to it making a strong impression on the participants. A similar situation also appears in the insurance group.

The Zurich website

The Zurich website was the fourth performer in terms of design style in the insurance group. The participants have a strong impression of white and blue. The important lines for the participants are horizontal and vertical lines. The shape is the square. Regarding texture selection, the participants have a great impression of plain structures. The important font is Arial. Finally, many participants chose plain text.

In addition, the Zurich website had the worse performance in terms of colour and interface in this group. Regarding colour use, a different order is obtained from part one-the results of the participants' protocol data and part three-the results of questionnaires. In participant's opinions, the Zurich website had the best performance in terms of colour because the participants did not express many opinions about colour. But, as mentioned in the results of questionnaires, the Zurich website had the worst performance in terms of colour. As mentioned above, the results from questionnaires are more reasonable than those only from participants' opinions. The fact is that Zurich has the worst performances in terms of colour use and interface. In addition, the performance of animation at Zurich is not as good as that of other websites.

The Churchill website

Although the Churchill website was the third performer in terms of design style in the insurance group, this website has the best performance in terms of colour, interface, and animation for the insurance group. The evidence was based on the results of the participants' protocol data and the results of questionnaires. The two different sorts of data showed the same results for the Churchill website.

The strong impression colours are white and violet for the participants. The important line for participants is the horizontal line, and the important shape is the square.

Regarding texture selection, the participants have a strong impression of plain, soft, and tangible structures. The important font is Arial. Finally, many participants chose boldface text and plain text.

In the insurance group, the participants expressed negative impressions on the mood boards. As discussed above, the best performance was not demonstrated by the participants in this test. During the test process, many participants felt satisfied about the performance of the Churchill website. In this group, the negative influence of animation strongly appears as the result of design style.

The Sta Travel website

The Sta Travel website had the worst performance in terms of design style in the insurance group. For colour selection, the participants chose blue. The lines are horizontal and vertical lines. The important shape is the square. Regarding texture selection, the participants have a great impression of plain and soft structures. The font is Arial. The important text is plain text.

Sta Travel had a worse performance in terms of colour and interface. The interface of Sta Travel is very similar to the current blog interface design. By using several squares with a great deal of text, this interface is not good for accessibility. In addition, the font size is very small and no highlight colour is used to distinguish the difference between the main text and the title text, so this design cannot supply good readability for viewers. Many participants show on the boards that their impressions are focused on its colour use.

The Bupa website

At last, the Bupa website was the second performer in terms of design style in the insurance group. For colour selection, the participants have a great impression of white, blue, and green. The important line is the horizontal line. The shape of this website is the square. Regarding texture selection, the participants chose plain, rough, and soft structures. The important font is Arial. Finally, many of the participants chose plain text for their text selection.

Bupa had the worse performance in terms of interface but better performances in colour and animation. The colour use of Bupa had made a strong impression on the participants. Many participants showed this sort of impression on the boards.

Design styles and basic drawing components have been compared site by site in this section-the results of EPs testing. In addition, the results of design style have also been compared and discussed with the results of the participants' protocol data and the results of questionnaires.

The individual factors and observations will be used to produce the details of the website reference model. The results of EPs testing supply two different considerations for the next stage of the research. The first consideration is which factors can influence the design style. The questionnaires should explore this aspect and cover all of the web design factors in order to decide correctly the relationship between design style and the web design factors. This point has been discussed above because website design is very different from traditional graphic design in creating users' impressions. The other consideration is how to undertake research stages in order to improve EPs testing in website design.

5.5 The results of questionnaires

Part three-the results of questionnaires will be shown for the fashion group and the insurance group. The performances of every design factor and their influences will be discussed in the following, one by one.

The online questionnaire was divided into ten groups and eleven questions. The titles are quality of content, loading time, navigation, links, interface, animation, consistencies, use of colour, use of layout, and information presentation. In the quality of content selection, this group was divided into two questions. The first one was from unexciting to exciting. The second one was from low to high. Each group has a pair of adjectival nouns and rating choices from one to five. By conducting mean values and standard deviations, the participants' degree of satisfaction with each design factors can be measured using this method.

The standard deviation measures the spread of the data for the mean value. This method is useful in comparing a great amount of data which may have the same mean but a different range. This situation has appeared in the results of the participants' protocol data. By comparing the results of individual factors, researchers can obtain the performances of the design factors in order to decide which test website can provide better performances in terms of these web factors. Regarding the test results, this situation actually appeared in many groups where the same means were obtained

but different standard deviations.

Figure 5.27 and table 5.28 show the results of questionnaires for the fashion group. In addition, figure 5.29 and table 5.30 show the results of questionnaires for the insurance group.

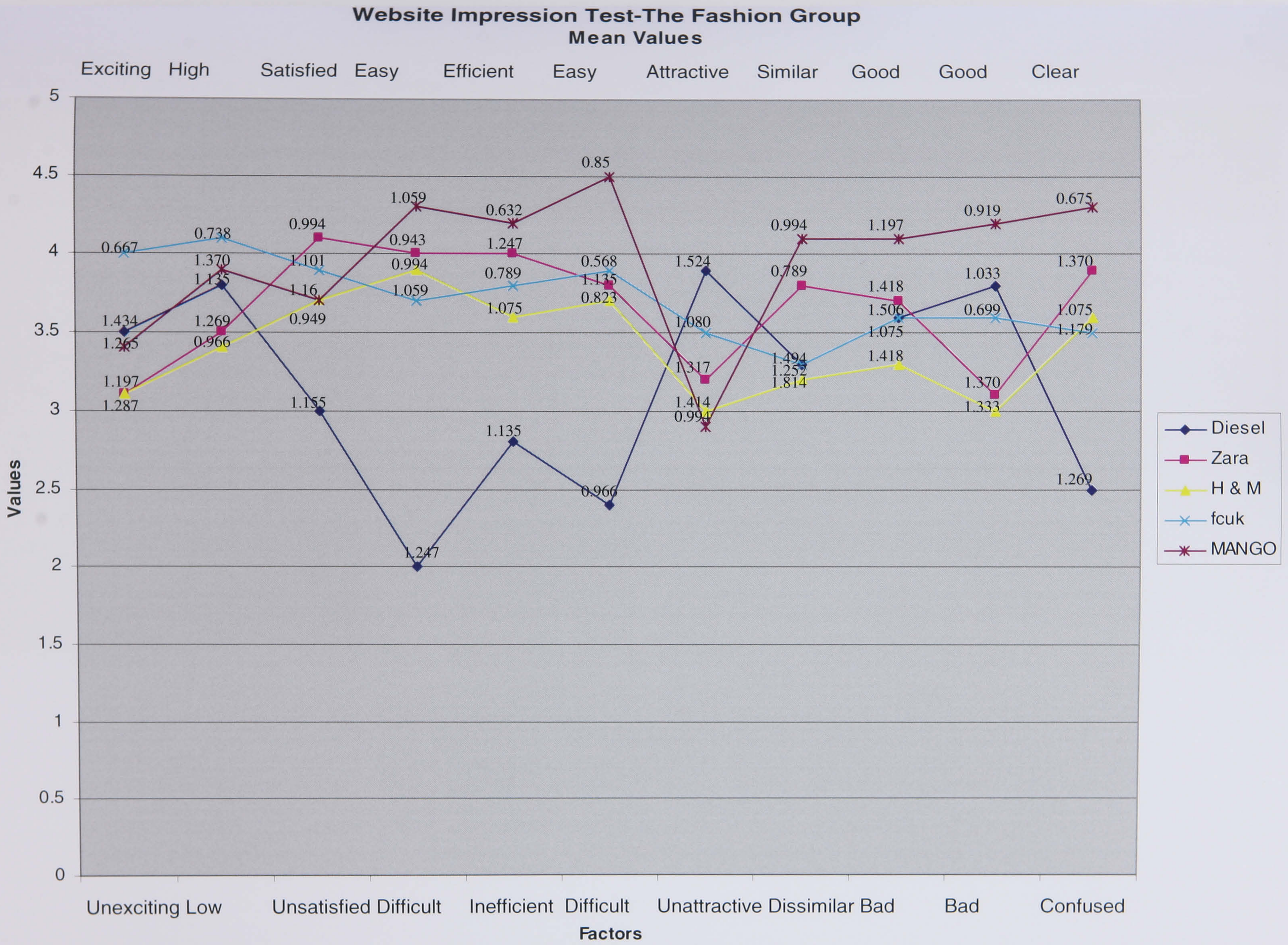


Figure 5.27 the mean values and standard deviations for the fashion group

Table 5.28 the results of the mean values and standard deviations of the fashion group

		Sort of website: Fashion									
		Diesel		Zara		H & M		fcuk		MANGO	
Factors	Adjectival nouns	MV	SD	MV	SD	MV	SD	MV	SD	MV	SD
Quality of Content	Unexciting Exciting	3.5	1.434	3.1	1.197	3.1	1.287	4	0.667	3.4	1.265
Quality of Content	Low High	3.8	1.135	3.5	1.269	3.4	0.966	4.1	0.738	3.9	1.37
Loading Time	Unsatisfied Satisfied	3	1.155	4.1	0.994	3.7	0.949	3.9	1.101	3.7	1.16
Navigation	Difficult Easy	2	1.247	4	0.943	3.9	0.994	3.7	1.059	4.3	1.059
Links	Inefficient Efficient	2.8	1.135	4	1.247	3.6	1.075	3.8	0.789	4.2	0.632
Interface	Difficult Easy	2.4	0.966	3.8	1.135	3.7	0.823	3.9	0.568	4.5	0.85
Animation	Unattractive Attractive	3.9	1.524	3.2	1.317	3	1.414	3.5	1.08	2.9	0.994
Consistencies	Dissimilar Similar	3.3	1.494	3.8	0.789	3.2	1.814	3.3	1.252	4.1	0.994
Use of Colour	Bad Good	3.6	1.506	3.7	1.418	3.3	1.418	3.6	1.075	4.1	1.197
Use of Layout	Bad Good	3.8	1.033	3.1	1.37	3	1.333	3.6	0.699	4.2	0.919
Information Presentation	Confused Clear	2.5	1.269	3.9	1.37	3.6	1.075	3.5	1.179	4.3	0.675

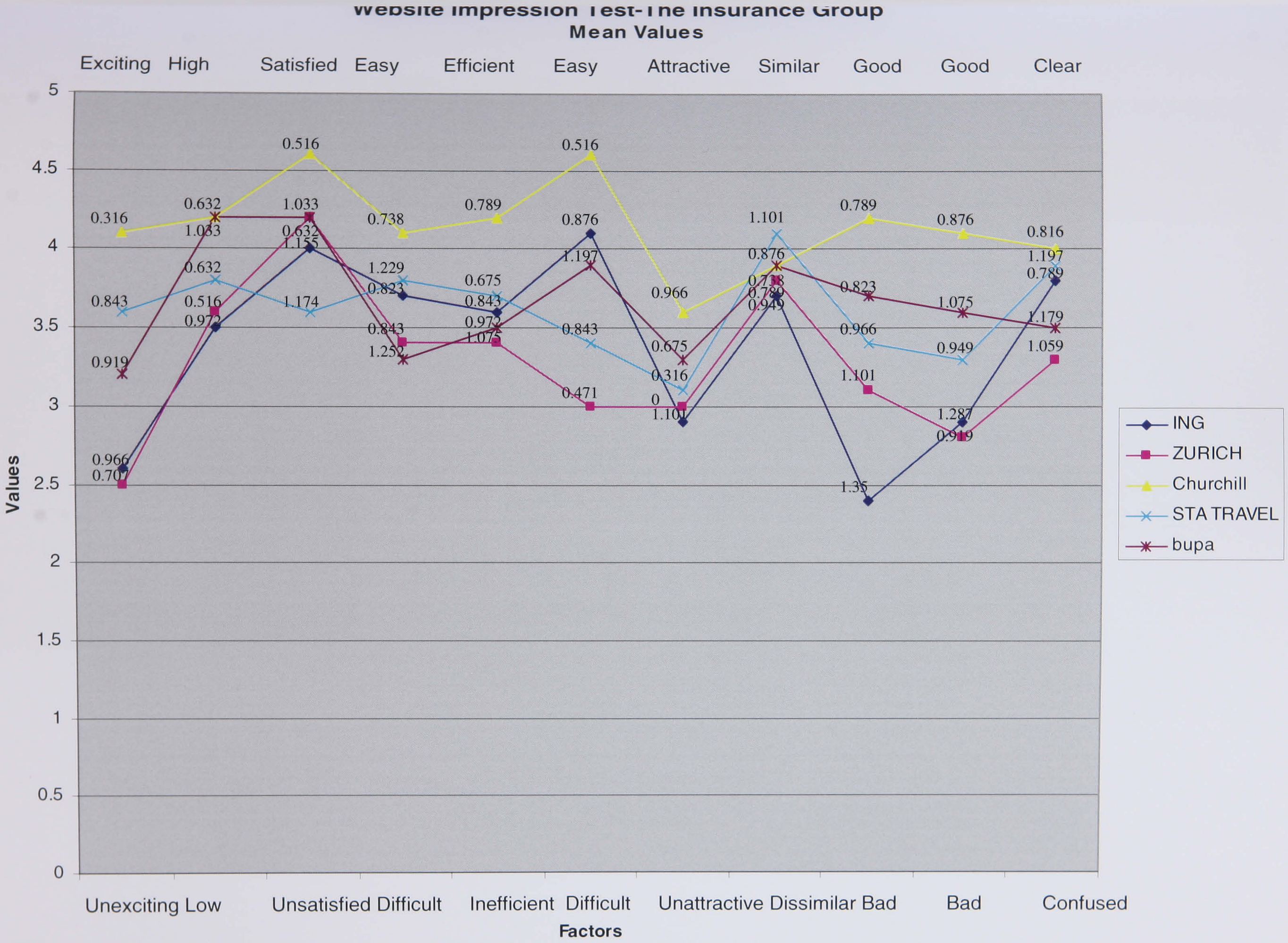


Figure 5.29 the mean values and standard deviations for the insurance group

Table 5.30 the results of the mean values and standard deviations of the insurance group

		Sort of website: Insurance									
		ING		ZURICH		Churchill		STA TRAVEL		bupa	
Factors	Adjectival nouns	MV	SD	MV	SD	MV	SD	MV	SD	MV	SD
Quality of Content	Unexciting Exciting	2.6	0.966	2.5	0.707	4.1	0.316	3.6	0.843	3.2	0.919
Quality of Content	Low High	3.5	0.972	3.6	0.516	4.2	0.632	3.8	0.632	4.2	1.033
Loading Time	Unsatisfied Satisfied	4	1.155	4.2	1.033	4.6	0.516	3.6	1.174	4.2	0.632
Navigation	Difficult Easy	3.7	0.823	3.4	0.843	4.1	0.738	3.8	1.229	3.3	1.252
Links	Inefficient Efficient	3.6	0.843	3.4	1.075	4.2	0.789	3.7	0.675	3.5	0.972
Interface	Difficult Easy	4.1	0.876	3	0.471	4.6	0.516	3.4	0.843	3.9	1.197
Animation	Unattractive Attractive	2.9	1.101	3	0	3.6	0.966	3.1	0.316	3.3	0.675
Consistencies	Dissimilar Similar	3.7	0.949	3.8	0.789	3.9	0.876	4.1	1.101	3.9	0.738
Use of Colour	Bad Good	2.4	1.35	3.1	1.101	4.2	0.789	3.4	0.966	3.7	0.823
Use of Layout	Bad Good	2.9	1.287	2.8	0.919	4.1	0.876	3.3	0.949	3.6	1.075
Information Presentation	Confused Clear	3.8	0.789	3.3	1.059	4	0.816	3.9	1.197	3.5	1.179

5.5.1 The fashion group

Question one-quality of the contents from unexciting to exciting

For question one-quality of content from unexciting to exciting, the performance for this factor, from high to low, is Fcuk, Diesel, Mango, Zara, and H & M. Zara and H & M have the same mean value for this question but Zara's standard deviation is lower than that of the H & M website.

In the fashion group, Diesel and Fcuk have more special animation designs than the other three test websites. The Diesel website was constructed of several different styles of animation design. In addition, the Fcuk website has good quality online videos to present the designers' thoughts and fashion shows to the public. This point was also been based on the results of EPs testing. Animation design plays a very important role in creating exciting factors for the viewers.

Question two-quality of the contents from low to high

For question two-quality of content from low to high, the order of performance in this factor, from high to low, is Fcuk, Mango, Diesel, Zara, and H & M. The best performance still appeared to be the Fcuk website. For these two factors-questions one and two, the Fcuk website got the highest mean with a lower SD. The standard deviations are 0.667 and 0.738. This result is different from the results of the participants' protocol data.

Question three-loading time from dissatisfied to satisfied

For question three-loading time from dissatisfied to satisfied, the order of performance for this factor, from high to low, is Zara, Fcuk, H & M, Mango, and Diesel. The Zara website had the best performance regarding loading time. Zara's mean value is 4.1 and its standard deviation is 0.994. For this factor, the H & M and Mango websites have the same mean values for loading time but H & M's SD is lower than that of Mango.

Question four-navigation from difficult to easy

For question four-navigation from difficult to easy, the order of performance, from high to low, is Mango, Zara, H & M, Fcuk, and Diesel. The Mango website had the

best performance in terms of navigation but a higher standard deviation of 1.059. In addition, the Zara website was the second in terms of navigation. The mean value of the Zara website is 4 and its standard deviation is 0.943 for navigation. The best performance in terms of navigation are considered to be by Mango and Zara. Regarding navigation, the Diesel website had a very lower mean value-2 (SD: 1.247) for this factor. Comparing the participants' opinions, the main reason is that too many different navigations were designed together for this website. On first visit, the participants need to take a long time to become familiar with the navigations. This situation can easily cause the participants to experience negative emotions.

The Mango website set the navigation at the bottom. In addition, Zara set it at the top in a traditional method. Regarding the content pages' navigation, the Mango website is better than that of Zara because many participants in this group showed that the navigation with a list of small images and the zoom function in navigation are very convenient for users. A similar point about navigation between Mango and Zara is the response time. On these two websites, the click time to change to other pages is shorter than for the other three test websites.

Question five-links from inefficient to efficient

For question five-links from, inefficient to efficient, the order of performance regarding links, from high to low, is Mango, Zara, Fcuk, H & M, and Diesel. For this factor, the Mango website showed the best performance in terms of links. Mango's mean value for links is 4.2 and the standard deviation is 0.632. This result showed that many participants felt satisfied with the performance of the links on the Mango website.

Comparing the participants' opinions, the zoom function is a very successful design on the Mango website because it is convenient for users to control the sizes of product images quickly with high quality. In addition, the time for linking is very fast. Many links on this website can be done efficiently by the participants. The worst performance in terms of links was the Diesel website. Regarding this factor, Diesel's mean value is 2.8 and its standard deviation is 1.135. This reason may be due to the fact that the links are not easily designed with animation. The participants sometimes found it difficult to click on this website. If this problem can be improved, the Diesel website may achieve better performances in terms of its links.

Question six-interface from difficult to easy

For question six-interface from difficult to easy, the order of performances, from high to low, is Mango, Fcuk, Zara, H & M, and Diesel. The best performance regarding interface was the Mango website. For this design factor, the Mango website has 4.5 as its mean value and 0.85 for its standard deviation. This result showed that the participants like Mango's interface design, while the Diesel website achieved the worst performance in this area. Its mean value was 2.4 and the standard deviation was 0.966. This result was the same for the results of participants' protocol data.

Regarding interface design, the Mango website uses a dropdown menu on the welcome and contents pages. On the contents pages, side navigations with a list of small images are widely used on this website. One disadvantage also appeared in many participants' opinions. The menu on the navigation bar should be made bigger for users. During the test process, many participants made errors when clicking on this menu.

Question seven-animation from unattractive to attractive

For question seven-animation from unattractive to attractive, the order of performances from high to low is Diesel, Fcuk, Zara, H & M, and Mango. For this design factor, the Diesel website had the best performance, with a 3.9 mean value and a 1.524 standard deviation. The second website was the Fcuk website with a 3.5 mean value and a 1.08 standard deviation. The worst website was Mango with a 2.9 mean value and a 0.994 standard deviation. This situation was the same for the results of the participants' protocol data and the results of EPs testing.

The Diesel website consisted of several high quality animations. In addition, the Fcuk website supplies several online videos of high quality. Both of them create positive emotions by the animation for the viewers.

Question eight-consistencies from dissimilar to similar

For question eight-consistencies from dissimilar to similar, the order of performances from high to low is Mango, Zara, Fcuk, Diesel, and H & M. The Mango website had the best performance in terms of consistency with a 4.1 mean value and a 0.994 standard deviation. In addition, the second best performing website, Zara, had a 3.8 mean value and a 0.789 standard deviation. To compare the visual effects of Mango and Zara's websites, their colour use and the interface designs are very similar

between the welcome and the content pages. The other three websites had different design styles on the welcome and the content pages. The main differences are colour use and interface design.

Question nine-use of colour from bad to good

For question nine-use of colour from bad to good, the order of performances for this design factor, from high to low, is Mango, Zara, Fcuk, Diesel, and H & M. The best website for colour use was Mango with a mean value of 4.1 and a standard deviation of 1.197. The second best performing website was Zara with a mean value of 3.7 and a standard deviation of 1.418.

For this factor, the five test websites got higher standard deviations and over one. This situation may be due to the fact that the participants had many different opinions about colour use. Comparing the results of the participants' protocol data, the Mango website also had the best performance regarding colour use. The results about colour performances can be compared and are shown in table 5.31.

Table 5.31 the results from comparing colour performances for the fashion group

Sort of Website: Fashion					
Sources/ Order	1	2	3	4	5
Participants' protocol data	Fcuk		Diesel		Zara
	Mango		H & M		
Questionnaires	Mango	Zara	Fcuk	Diesel	H & M
Mean values	4.1	3.7	3.6	3.6	3.3
Standard deviations	1.197	1.418	1.075	1.506	1.418

Question ten-use of layout from bad to good

For question ten-use of layout from bad to good, the order of performances, from high to low, is Mango, Diesel, Fcuk, Zara, and H & M. The best performance in use of layout was the Mango website, with a mean value of 4.2 and a standard deviation of 0.919. The layout was classified into interface from the results of the participants' protocol data. In the first part, the design factor interface consisted of part three-the performances in interface and use of layout.

Question eleven-information presentation from confused to clear

For question eleven-information presentation from confused to clear, the order of performances from high to low regarding this factor is Mango, Zara, H & M, Fcuk, and Diesel. The best performance in information presentation was the Mango website with the highest mean value of 4.3 and the lower standard deviation of 0.675. About this design factor, the performance of Mango can be considered in producing the fashion website design reference model. The Diesel website had the worst performance for information presentation, with the lower mean value of 2.5 and a standard deviation of 1.269. This situation may be due to the influence of several design styles. During the test process, many participants felt confused about Diesel's information presentation. The participants were usually astonished by the new visual effects but also confused by the meanings.

5.5.2 The insurance group

Question one-quality of the contents from unexciting to exciting

For question one-quality of content from unexciting to exciting, the order of performances of the insurance group from high to low is Churchill, Sta Travel, Bupa, Ing, and Zurich. The best performance in this design factor was the Churchill website with the highest mean value of 4.1 and the lower standard deviation of 0.316. The worst website was Zurich with the lowest mean value of 2.5 and the lowest standard deviation of 0.707.

Question two-quality of the contents from low to high

For question two-quality of content from low to high, the order of performances from high to low regarding this factor is Churchill, Bupa, Sta Travel, Zurich, and Ing. The Churchill website showed the best performance for this factor with a mean value of 4.2 and the lowest standard deviation of 0.632. In addition, the Bupa website had the same mean value as Churchill but had a higher standard deviation of 1.033. The worst website was Ing with the worst mean value of 3.5 and the lower standard deviation of 0.972.

Comparing the results of EPs testing, the Ing website had the strongest performance in terms of design style due to the participants' negative emotions. The evidence for this is that the Ing website performed worse in the contents part, but this part is the first consideration for the reference model.

Question three-loading time from dissatisfied to satisfied

For question three-loading time from dissatisfied to satisfied, the order of performances from high to low is Churchill, Bupa, Zurich, Ing, and Sta Travel. The best performance regarding loading time at the insurance group was the Churchill website with the highest mean value of 4.6 and a lower standard deviation of 0.516. Bupa and Zurich has the same mean value regarding loading time but Bupa's standard deviation is lower than that of Zurich. The worst website was Sta Travel, with the worst mean value of 3.6 and a standard deviation of 1.174.

Regarding this factor, the results of the questionnaires were very different from the results of the participants' protocol data. Through conducting the statistics, the results of the questionnaires are more reasonable than the results of the participants' opinions. The main reason is that the participants did not express any opinions at all about loading time but this section was completed by every participant in the questionnaire.

Question four-navigation from difficult to easy

For question four-navigation from difficult to easy, the order of performances, from high to low, is Churchill, Sta Travel, Ing, Zurich, and Bupa. The best performance was the Churchill website with the highest mean value of 4.1 and the lower standard deviation of 0.738. Bupa had the worst performance in terms of navigation, with the worst mean value of 3.3 and the higher standard deviation of 1.252.

The Churchill website has several advantages in terms of navigation design. This website was constructed in the top menu. It is very clear to distinguish the differences between internal links, external links, content texts, and title texts. Using different size of fonts and types of texts can help users to become familiar with its navigation in a short period of time. At the results of the participants' protocol data, the Churchill website had the same results in terms of navigation.

Question five-links from inefficient to efficient

For question five-links from inefficient to efficient, the order of performances in terms of this factor, from high to low, is Churchill, Sta Travel, Ing, Bupa, and Zurich. The best performance regarding links was the Churchill website with the highest mean value of 4.2 and the lower standard deviation of 0.789. From the results of the first part, the order of the links did not form the foci in order to establish the order of the

links. This result can only be obtained from the results of the questionnaires.

As stated previously, this site clearly distinguishes the differences between the internal links, external links, content texts, and title texts. Users can become familiar with its navigation in a short period of time. To reduce the time costs of learning or becoming familiar with the new navigation, the links can become more efficient.

Question six-interface from difficult to easy

For question six-interface from difficult to easy, the order of performances regarding interface, from high to low, is Churchill, Ing, Bupa, Sta Travel, and Zurich. About the interface factor, the results of part one were the same as for part three. The Churchill website had the best performance in terms of interface, with the highest mean value of 4.6 and the very much lower standard deviation of 0.536. The worst website was Zurich, with the worst mean value of 3 and the lowest standard deviation of 0.471.

The Churchill website uses the top menu and clearly distinguishes the different functions of the text on this site. In addition, its logo is the nodding dog, and many participants were interested to see if this logo appears on the contents pages and the welcome page. This logo creates very positive emotions for the participants.

Question seven-animation from unattractive to attractive

For question seven-animation from unattractive to attractive, the order of performances for the design factor, from high to low, is Churchill, Bupa, Sta Travel, Zurich, and Ing. The best website in terms of animation was the Churchill website, with the highest mean value of 3.6 and the lowest standard deviation of 0.966. The worst website was Ing, with the worst mean value of 2.9 and a standard deviation of 1.101.

Regarding the animation factor, this result was the same as the results for the participants' protocol data. Comparing the results of EPs testing, Ing had the strongest performance in terms of design style. This point was emphasized above. During the test process, many participants argued about the Ing animation, the orange jumping ball, but this animation was strongly shown on the boards. This evidence can explain why the best design style for the insurance group is to show the participants' negative emotions. This evidence can also be seen in the results for colour performance.

Question eight-consistencies from dissimilar to similar

For question eight-consistencies from dissimilar to similar, the order of performances for this design factor, from high to low, is Sta Travel, Bupa, Churchill, Zurich, and Ing. The best website in terms of consistencies was Sta Travel, with the highest mean value of 4.1 and the highest standard deviation of 1.101. The worst website was Ing, with the worst mean value of 3.7 and the lowest standard deviation of 0.949. For this factor, Bupa and Churchill had the same mean value but Bupa's standard deviation was lower than that of Churchill.

Question nine-use of colour from bad to good

For question nine-use of colour from bad to good, the order of performances in terms of colour use, from high to low, is Churchill, Bupa, Sta Travel, Zurich, and Ing. The best website in terms of colour use was Churchill with the highest mean value of 4.2 and the lowest standard deviation of 0.789. The worst website was Ing, with the worst mean value of 2.4 (this number is below three.) and a standard deviation of 1.35.

Comparing the results from part one and part three, the orders of colour performance are very different. As mentioned previously, the results of questionnaires are more reasonable than in part one. This result relates to table 5.32.

Table 5.32 the results from comparing colour performances for the insurance group

Sort of Website: Fashion					
Sources/ Order	1	2	3	4	5
Participants' protocol data	Bupa	Zurich	Churchill	Sta Travel	Ing
Questionnaires	Churchill	Bupa	Sta Travel	Zurich	Ing
Mean values	4.2	3.7	3.4	3.1	2.4
Standard deviations	0.789	0.823	0.966	1.101	1.35

Doubtless, the Ing website had the worst performance of these two different sources in terms of colour use. Comparing the participants' boards about the Ing website, this bad colour use also appeared in the participants' drawings. This is further evidence to explain why the best design style of the insurance group is due to the fact that it appeals to the participants' negative emotional responses.

Question ten-use of layout from bad to good

For question ten-use of layout from bad to good, the order of performances in terms of layout, from high to low, is Churchill, Bupa, Sta Travel, Ing, and Zurich. This result was similar to the results of the participants' protocol data. The Churchill website had the best performance in terms of layout, with the highest mean value of 4.1 and the lowest standard deviation of 0.876. The worst website was Zurich, with the worst mean value of 2.8 and the lowest standard deviation of 0.919.

Question eleven-information presentation from confused to clear

For question eleven-information presentation from confused to clear, the order of performances relating to information presentation, from high to low, is Churchill, Sta Travel, Ing, Bupa, and Zurich. The best performance regarding information presentation was that of the Churchill website, with the highest mean value of 4 and the lowest standard deviation of 0.816. The worst website was Zurich with the lowest mean value of 3.3 and a standard deviation of 1.059.

5.6 Summary

Tables 5.33 and 5.34 below present the total performance for each design factor for the fashion group and the insurance group.

Table 5.33 the order of design factors performances for the fashion group

Sort of Website: Fashion					
Factors/ Order	1	2	3	4	5
Quality of content 1	Fcuk	Diesel	Mango	Zara	H & M
Quality of content 2	Fcuk	Mango	Diesel	Zara	H & M
Loading time	Zara	Fcuk	H & M	Mango	Diesel
Navigation	Mango	Zara	H & M	Fcuk	Diesel
Links	Mango	Zara	Fcuk	H & M	Diesel
Interface	Mango	Fcuk	Zara	H & M	Diesel
Animation	Diesel	Fcuk	Zara	H & M	Mango
Consistencies	Mango	Zara	Fcuk	Diesel	H & M
Use of colour	Mango	Zara	Fcuk	Diesel	H & M
Use of layout	Mango	Diesel	Fcuk	Zara	H & M
Information presentation	Mango	Zara	H & M	Fcuk	Diesel

Table 5.34 the order of design factors performances for the insurance group

Sort of Website: Insurance					
Factors/ Order	1	2	3	4	5
Quality of content 1	Churchill	Sta Travel	Bupa	Ing	Zurich
Quality of content 2	Churchill	Bupa	Sta Travel	Zurich	Ing
Loading time	Churchill	Bupa	Zurich	Ing	Sta Travel
Navigation	Churchill	Sta Travel	Ing	Zurich	Bupa
Links	Churchill	Sta Travel	Ing	Bupa	Zurich
Interface	Churchill	Ing	Bupa	Sta Travel	Zurich
Animation	Churchill	Bupa	Sta Travel	Zurich	Ing
Consistencies	Sta Travel	Bupa	Churchill	Zurich	Ing
Use of colour	Churchill	Bupa	Sta Travel	Zurich	Ing
Use of layout	Churchill	Bupa	Sta Travel	Ing	Zurich
Information presentation	Churchill	Sta Travel	Ing	Bupa	Zurich

In general, the Mango website had the best performances regarding design factors for the fashion group. According to the results of the participants' protocol data, content plays a very important role in web design factors. The Fcuk content should be considered well by the fashion group in order to produce the web design reference model. For the insurance group, the Churchill website had the best performance in terms of design factors. This result also agrees with the results of the participants' protocol data.

After conducting the analysis of the website impression test (W.I.T.), the importance of emotional design had been supported in this study. In two test groups, emotion plays a vital factor in website design. This study can supply another sort of thinking for website test. In addition, the results of Emotional Probes testing are very different from the previous test plan. After conducting the website impression test, the results of participants' protocol opinions and the results of questionnaires can explain this situation. To use EPs testing in the website design field may be better to involve the influence of animation and to consider further in web colour. At least, traditional graphic design factors can not explain the difference performance of design style between the fashion group and the insurance group. To investigate the test process and the results of EPs testing, this method is very helpful for designers or researchers to measure participants' impressions. Participants showed very clearly and correctly in the visual performances of test websites. The considerations for improving this method in evaluating web design outcomes will be discussed in the following chapter-research outcomes-the website design reference model and the website

impression test system.

The questionnaires supplies a efficient evaluation method to solve the weaknesses about Think-Aloud usability testing. To compare the results of questionnaires and the results of participants' protocol data is not difficult to find differences in this test. Some design factors had very different performances in the test results. This result also pointed out qualitative research sometime need quantitative data to support this study. It also revealed the value and importance of triangulation in qualitative research. To use the triangulation in this study can reduce errors in the test process. The calculus method-mean values and standard deviations supplied a better way to decide the order of performance for design factors.

Chapter 6 Research Outcomes-the Website Design Reference Model and the Website Impression Test System

6.1 Introduction

This chapter explains the development of the fashion website design reference model, the insurance website design reference model, the improved website impression test (I.W.I.T.), and a fashion test website constructed from the fashion website design reference model. After conducting the website impression test (W.I.T.) and the analysis of the test results, these findings could be developed in several ways in order to help web designers to predict users' emotional responses to web outcomes. At this stage, the research was developed in two ways: to produce a website design reference model and a website impression test system in order to help web designers to undertake emotional design and measure the participants' emotional responses.

6.2 The fashion website design reference model

The order of design factors for the fashion group was decided after conducting the analysis of the website impression test (W.I.T.). For the fashion group, the order of the factors from the results of participants' protocol data, from high to low, was content, readability, emotion, navigation, colour, interface, loading time, links, animation, and sound but this was because only two sites used animation and sound. The order of website performance for individual design factors and the details of the design factors was based on the results of the questionnaires and the results of the emotional probes testing. The proportion and orders for the design factors for the fashion website design reference model is shown below in table 6.1.

The influence of animation and sound are worth discussing in the website design field. After conducting the website impression test, the importance of animation was emphasized in the results of the emotional probes testing. Many different types of animation are used widely on line. The development of technology increases the performance of animation and the performance of sound. Website development is driving towards this dimension. The test results also have shown its importance in this study. In addition, its importance had also been discussed in the literature review.

Table 6.1 the proportion of comments for each design factor for the fashion website design reference model

Factors	Proportion of comments	Order
Content	0.291	1
Readability	0.189	2
Emotion	0.146	3
Navigation	0.124	4
Colour	0.073	5
Interface	0.049	6
Loading time	0.046	7
Links	0.044	8
Animation	0.027	9
Sound	0.012	10

Regarding the content factor, the Fcuk website had the best performance in terms of this factor. Fcuk supplied information about shopping online, viewing the collection, stores, careers, about French Connection, and videos for the designers' concepts and fashion vs. style for users. For the readability factor, the best website was Mango. The Mango website used Arial, Times, and other types of fonts. On this site, the size of text was from 12 to 20 with big capitals at the navigation bar and titles. The text colour in this part was set to be white above the jelly black background. Another text's colour for links was set to be dark gray above a white background. The emphasized colour was flash pink. The size of the text changed to indicate the relative importance. In addition, clear fashion images were shown on the welcome page and the content page.

The best website in terms of emotion was Mango. In the fashion group, many emotional design problems came from participants' direct observation. The evidence can be found from participants' opinions. As mentioned previously in part one-the results of the participants' protocol data and part three-the results of the questionnaires in the previous chapter, the web classifications of the Mango website can supply some considerations for this design factor. In addition, the Mango website also had the best performance in terms of navigation. For the navigation factor, middle drop down navigation and side navigation with the lists of images was used on the welcome page and the content page. In addition, every content page contained simple choices for links which were presented in both images and text. Regarding the colour factor, the Mango website and the Fcuk website had better performances. The main colour

scheme on these websites was black and white. To compare the results of the emotional probes testing, the order of performance in terms of colour, from high to low, was C1-black: 8, C2-white: 8, C6-yellow: 5, C4-blue: 2, C7-red: 2, C9-green: 2, C10-brown: 2, C3-gray: 1, C5-viloet: 1, and C8-orange: 1 on the Mango website. The importance of colour can be classified into four levels from the result of the emotional probes testing for the Mango website. The first colour level is black and white. The second colour level is yellow. The third colour level is blue, red, green, and brown. The last colour level is gray, violet, and orange. The main colours used were black and white for the fashion website design reference model. On the Mango website, the background digital colour codes were #000000 (black) and #FFFFFF (white). The text colour codes from titles to content texts were #666666 (dark gray), #999999 (pale gray), and #FFFFFF (white). The high light colour codes in emphasized colour were #FF00FF (hue pink) and #FF99CC (dark pink).

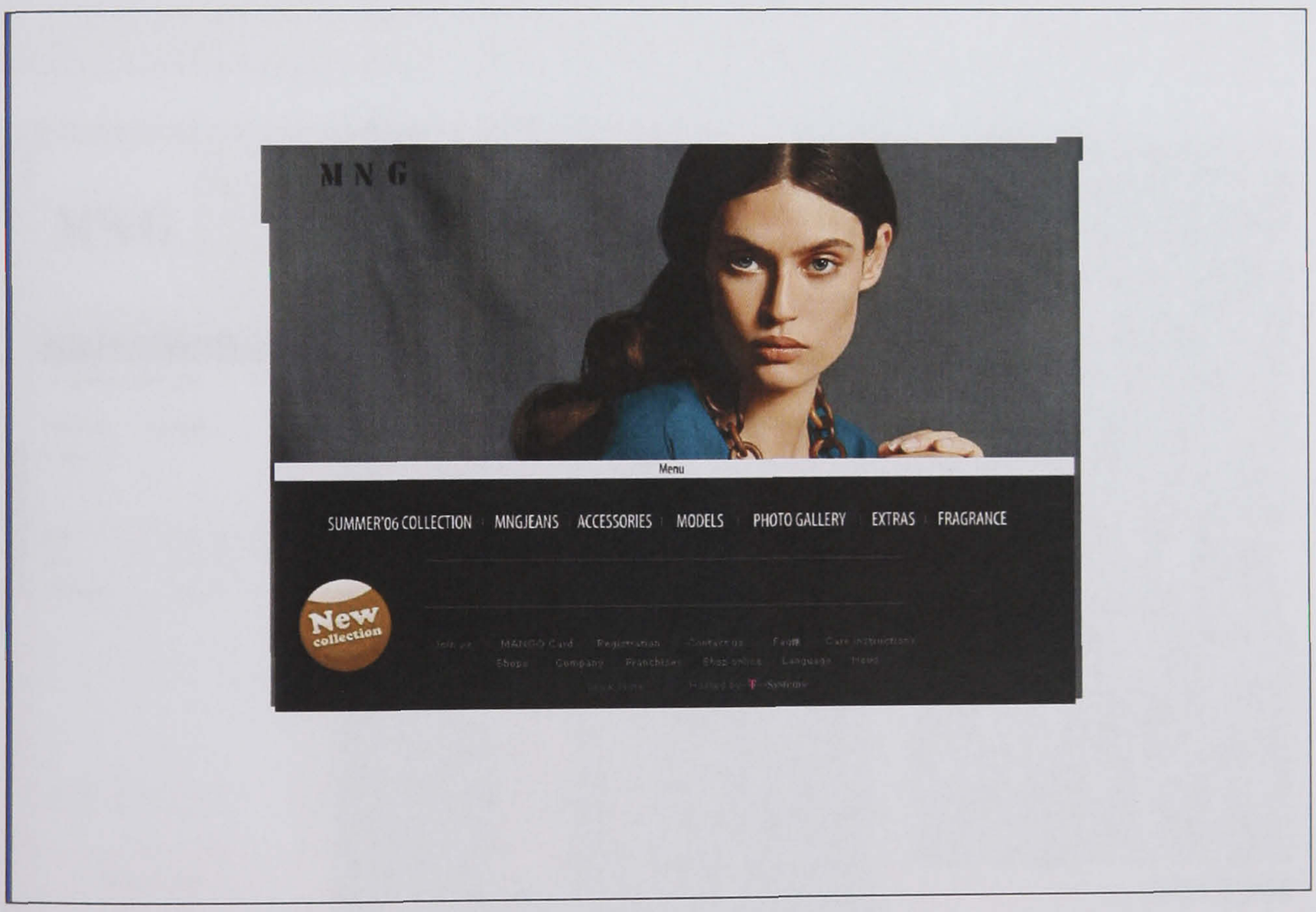


Figure 6.2 the drop down navigation at the welcome page on the Mango website

Figure 6.3 the side navigation and the zoom function at the content page on the Mango website

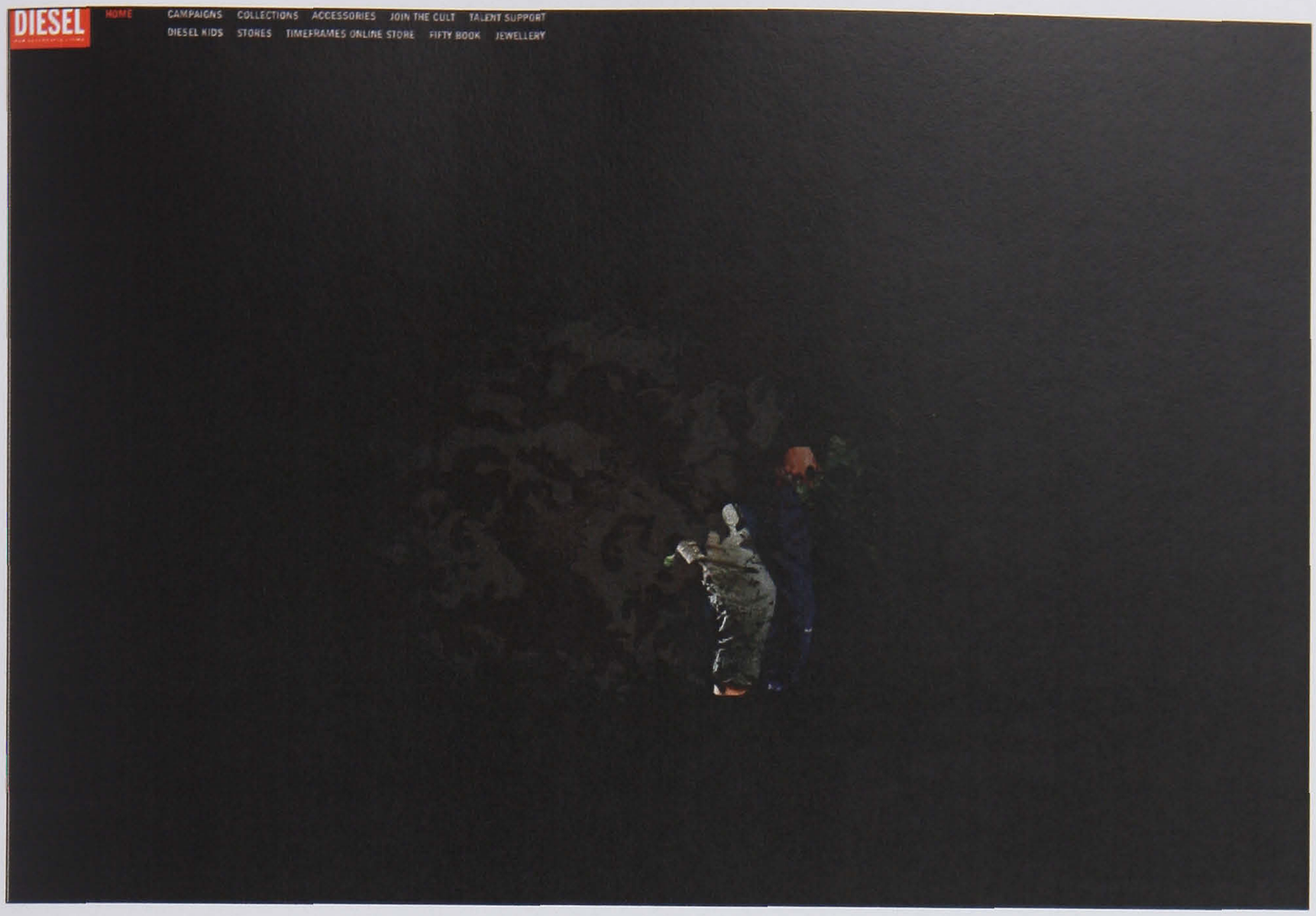
Above website images were downloaded in the period from 1st April 2006 to 15th April 2006.

The Mango website had the best performance in terms of interface. Figure 6.2 and 6.3 also show visual performance in terms of the interface used on the Mango website. Regarding colour selection, the participants had strong impressions of black and white. The important line was the horizontal line. Participants had a strong impression of squares. Regarding texture selection, the important sorts of texture were plain, hard, and tangible structures. The Mango website had the best performance in terms of colour use and interface. This is useful information about the visual factors regarding the details of interface.

The Zara website had the best performance in terms of loading time in the fashion group. On average, the loading time for the welcome page is about one or two seconds. Other content pages in terms of loading time had the same performance as the welcome page.

For the eighth design factor, the Mango website showed the best performance in terms of links. Mango's mean value for links was 4.2 and the standard deviation was 0.632. This result indicated that many participants felt satisfied with the performance of the links on the Mango website. Comparing the participants' opinions, the zoom function was very successful on the Mango website because it was convenient for users to control the size of product images quickly with high quality. In addition, the time for linking was very fast. Many links on this website could be done efficiently in one second by the participants. The worst performance in terms of links was the Diesel website. Regarding this factor, Diesel's mean value was 2.8 and its standard deviation was 1.135. The reason may be due to the fact that the Diesel used many internal links in animations which cost much time in navigation. The participants sometimes found it difficult to click on this website in the test process.

For the animation factor, the Diesel website had the best performance though the level of agreement was poor, with a 3.9 mean value and a 1.524 standard deviation. Figure 6.4 shows the visual effect of animation on the Diesel website. The second website was the Fcuk website with a 3.5 mean value and a 1.08 standard deviation. This result is supported by the results of the participants' protocol data and the results of EPs testing. The Diesel website consisted of several high quality animations. In addition, the Fcuk website supplied several online videos of high quality. Both of them created positive emotions through animation. Many participants thought that the sound effects were designed well in Diesel.


DIESEL
HOME
CAMPAIGNS
COLLECTIONS
ACCESSORIES
JOIN THE CULT
TALENT SUPPORT
DIESEL KIDS
STORES
TIMEFRAMES ONLINE STORE
FIFTY BOOK
JEWELLERY


DIESEL
Stores
Style Miles
Collection
Denim
Accessories
Intimate
Kids
Fashion Show
Advertising Campaign
Diesel Info and press
Legal
COLLECTION
SPRING SUMMER

Figure 6.4 the visual effect of animation on the Diesel website

The above website images were downloaded in the period from 1st April 2006 to 15th April 2006.

In the fashion group, Diesel and Fcuk had special animation features. In addition, only

Diesel and Zara had special sound design effects. On the Diesel website, the designers had used many different styles of animation. During the test process, many participants felt excited to watch these animation effects, especially an old movie effect and a moving cloud. The Fcuk website used videos for the designers' concepts and a video-fashion vs. style for users. This idea also supplied a satisfying emotion for participants in the test process.

The order of design factors for a fashion website design reference model was taken from the statistics of the participants' protocol opinions. The overall performance of the test websites for each design factor was taken from the results of the questionnaires. Concerning the users' impressions about colour and interface, the results of the emotional probes testing supplied the detailed information. It should be realized that the order of importance in the design reference model was used to determine the order of factors in the design guidelines.

The use of animation and sound still remains a wide debate in the website design field. Following developments in hardware and software, dynamic website design will play a more important role than before. We may consider-You Tube, this website has a high conversion rate at present. In addition, many web users used blogs on line. Users often put on videos to share with viewers. This situation explains that users' demands are not only limited to the traditional website design field. Designers and researchers may need to think about website design development from the perspective of dynamic design.

The fashion website design reference model and guidelines are shown below in figure 6.5 and table 6.6. Table 6.7 the guidelines for the fashion website design reference model, which was improved after conducting the improved website impression test (I.W.I.T.). The improvements in the guidelines involved the areas of emotion, navigation, links and sound.

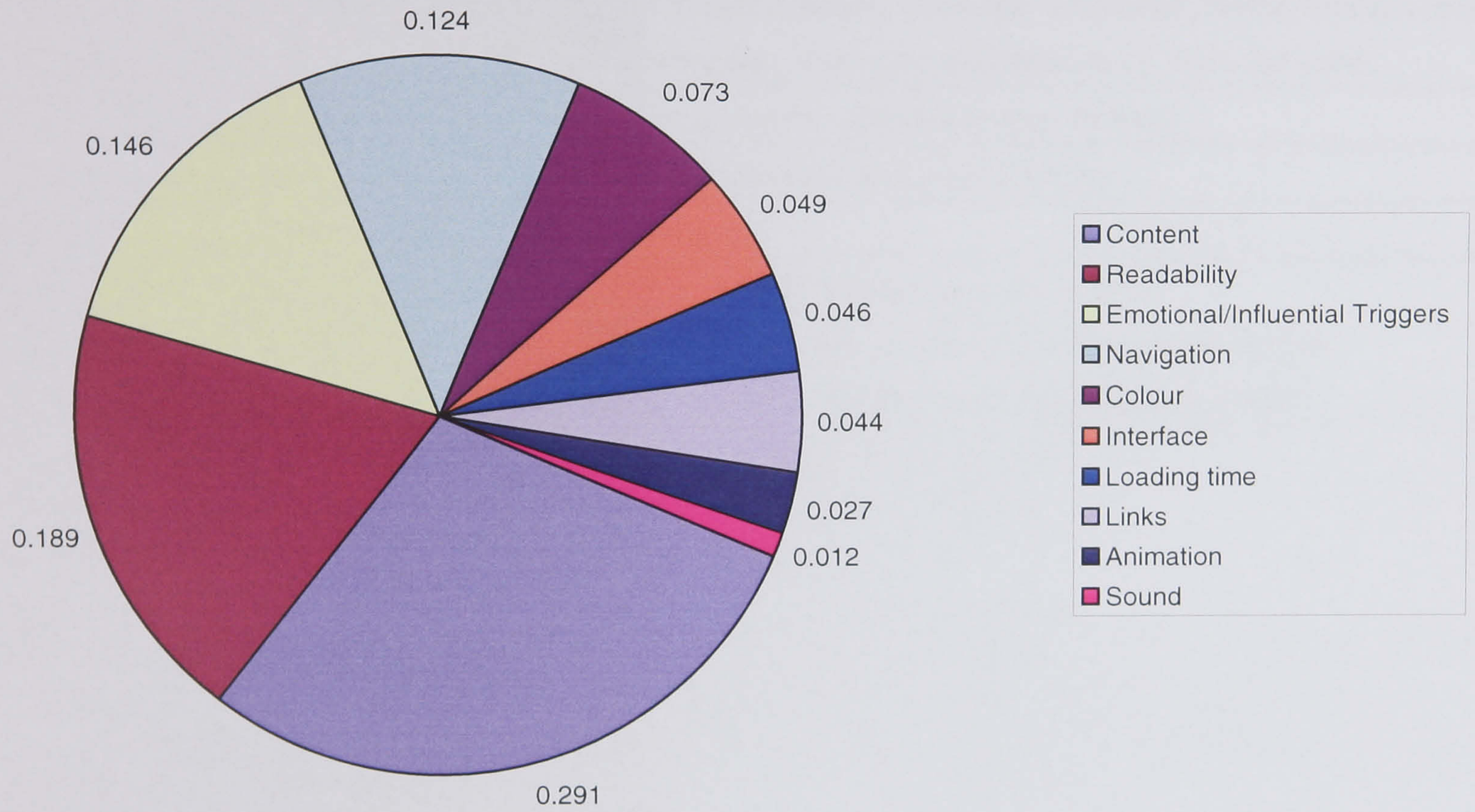


Figure 6.5 the fashion website design reference model

Table 6.6 the guidelines of the fashion website design reference model

The Guidelines of the Fashion Website Design Reference Model		
Factors	Design Points	Guidelines
Content	Web structure	Shopping online, view the collection, stores, careers, about brand, and videos for the designers' concepts and fashion vs. style for users
Readability	Fonts	Arial, times, and other types of fonts
	Texts	Coloured text and capital letters
	Font sizes	12 to 20
Emotion	Positive emotion	1. Middle drop down navigation 2. Right side navigation with a list of images 3. Zoom function with high quality images
	Negative emotion	1. Variation in design style 2. Variation in navigation 3. Flash colour use 4. No user control function
Navigation	The welcome page	Middle drop down navigation
	The content page	Right side navigation with a list of images
Colour	User's impression	The first level: black and white The second level: yellow The third level: blue, green, and brown The fourth level: gray, violet, and orange
	Background digital colour codes	#000000 (black) and #FFFFFF (white)

	Text colour codes	#666666 (dark gray), #999999 (pale gray), and #FFFFFF (white)
	High light colour codes	#FF00FF (hue pink) and #FF99CC (dark pink)
Interface	Lines	Horizontal line
	Shapes	Squares
	Texture	Plain, hard, and tangible structures
Loading time	1 to 2 second	
Links	Zoom function with high quality images	
Animation	The use of animation and videos was found to be affective and well received also the use of an old movie.	
Sound	Clear and suitable sound effects, and camera shot sound	

Table 6.7 the guidelines of the fashion website design reference model after conducting the improved website impression test

The Guidelines of the Fashion Website Design Reference Model		
Factors	Design Points	Guidelines
Content	Web structure	Shopping online, view the collection, stores, careers, about brand, and videos for the designers' concepts and fashion vs. style for users
Readability	Fonts	Arial, Times, and other types of fonts
	Texts	Coloured text and capital letters
	Font sizes	12 to 20
Emotion	Positive emotion	1. Middle drop-down navigation 2. Right side navigation with a list of images 3. Zoom function with high quality images
	Negative emotion	1. Variation in design style 2. Variation in navigation 3. Flash colour use 4. No user control function 5. Open new browser 6. No Colour balance
Navigation	The welcome page	1. Middle drop-down navigation 2. Set a back function in the text links following the page title and the logo back function

	The content page	1. Right side navigation with a list of images 2. Set a back function in the text links following the page title and the logo back function
Colour	User's impression	The first level: black and white The second level: yellow The third level: blue, green, and brown The fourth level: gray, violet, and orange
	Background digital colour codes	#000000 (black) and #FFFFFF (white)
	Text colour codes	#666666 (dark gray), #999999 (pale gray), and #FFFFFF (white)
	High light colour codes	#FF00FF (hue pink) and #FF99CC (dark pink)
Interface	Lines	Horizontal line
	Shapes	Squares
	Texture	Plain, hard, and tangible structures
Loading time	1 to 2 second	
Links	1. Zoom function with high quality images 2. Mouse click down function	
Animation	The use of animation and videos was found to be effective and well received, as was the use of an old film.	
Sound	1. Clear and suitable sound effects, and camera shot sounds 2. Database for the users' choice of sounds	

6.3 The insurance website design reference model

The order of design factors for the insurance group was decided after conducting the analysis of the website impression test. For the insurance group, the order of the factors from the results of participants' protocol data, from high to low was content, emotion, colour, interface, readability, navigation, loading time, animation, links, and sound but no test websites used special animation design and sound. The order of website performance for individual web design factors and the details of the web design factors was based on the results of the questionnaires and the results of the emotional probes testing. The proportion and orders for the design factors for the insurance website design reference model is shown in the following table 6.8.

Table 6.8 the proportion of comments for each design factor for the insurance website design reference model

Factors	Proportion of comments	Order
Content	0.237	1
Emotion	0.185	2
Colour	0.172	3
Interface	0.146	4
Readability	0.091	5
Navigation	0.078	6
Loading time	0.036	7
Animation	0.029	8
Links	0.026	9
Sound	0	10

Regarding the content factor, the Churchill website had the best performance in terms of quality of content in the factors unexciting to exciting and from low to high. On this site, Churchill supplied the main web classifications in car, travel, pet, breakdown, van, and motorcycle. At the left side of the welcome page, its award record is displayed in an obvious area for users. At the right side of the welcome page, the Churchill website supplied two direct links about travel insurance and home insurance for users. The less important links of the contents were shown at the bottom of the welcome page but text colour and size were not sufficiently clear. For question one-quality of content from unexciting to exciting, the best performance in this design factor was the Churchill website with the highest mean value of 4.1 and a low standard deviation of 0.316 showing a high level of agreement. For question

two-quality of content from low to high, the Churchill website also showed the best performance for this factor with a mean value of 4.2 and a low standard deviation of 0.632. A general problem related to the contents for the insurance group was too much text. In addition, this sort of website had no charming points for the participants. According to the participants' opinions, the best way was for customers to discuss their insurance details with the sellers face to face. However, users did enjoy observing that efficient contact methods are clearly shown on insurance websites. In the results of participants' protocol data, the best website for the content factor was still the Churchill website. For this factor, the results of the questionnaires agreed with the results of the participants' protocol data.

In the insurance group, emotion was the second most important in terms of design factors. In the results of participants' protocol data, for this factor, the best website was Churchill. The worst website was Ing because many of the participants complained about its animation, colour use, and that it also contained too much text. Participants in the test process often declared these problems. In this group, emotional problems mainly resulted from usability; this result is different from that of the fashion group. The evidence can be compared and discussed from the participants' opinions. For the fashion group, many emotional problems were caused by the participants' direct like or dislike. If the users' emotional responses resulted from usability, this design problem can be improved. If not, these emotional responses should be discussed in the contents field. For the insurance group, there were lower emotional value ranges than for the fashion group. The main problem was that the participants felt that surfing fashion websites is more interesting than visiting insurance websites. Compared with the initial pilot test (I.P.T.), the main test results showed that to surf insurance websites was very boring for the participants. Lower mean values with lower standard deviations appeared in the insurance group in the pilot test.

In the results of the questionnaires, the best website in terms of colour use was Churchill with the highest mean value of 4.2 and the lowest standard deviation of 0.789. Comparing the results between participants' protocol data and the questionnaires, the orders of colour performance were very different. As mentioned previously, the results of the questionnaires help to support or challenge participants' opinions. The strong impression colours were white and violet for the participants on the Churchill website. Using the results of the emotional probes testing, the order of performances in terms of colour, from high to low, was C2-white: 4, C5-violet: 4, C4-blue: 3, C3-gray: 2, C7-red: 2, C8-orange: 2, C6-yellow: 1, and C9-green: 1 on

the Churchill website. The importance of colour was classified into four levels. The first colour level is violet and white. The second colour level is blue. The third colour level is gray and red. The last colour level is yellow and green. The main colour used was violet and white for the insurance website design reference model.

Figure 6.9 the welcome pages of the Churchill website

The above website image was downloaded in the period from 1st April 2006 to 15th April 2006. The below website image was download on 10th February 2007.

On the Churchill website, the background digital colour codes was #FFFFFF (white). The text colour codes from titles to content texts were #663399 (violet), #4598E0 (blue), #0080C0 (blue), #666666 (dark gray), #333333 (hue gray), and #FFFFFF (white). The high light colour codes in emphasized colour were #D82832 (red) and #FF6600 (orange).

The Churchill website also had the best performance in terms of interface for the insurance group. For the interface factor, the results of participants' opinions were the same as for the results of the questionnaires. The Churchill website had the best performance in terms of interface, with the highest mean value of 4.6 and the very much lower standard deviation of 0.536. This result showed that participants had strong agreement for the Churchill interface performance. The Churchill website used a top menu and clearly distinguished the different functions of the text on this site. In addition, its logo was the nodding dog, and many participants were interested to see if this logo appeared on the contents pages and the welcome page. This logo created very positive emotions for the participants. In the results of the emotional probes testing, on the Churchill website, the important line for participants was the horizontal line, and the important shape was the square. Regarding texture selection, the participants had a strong impression of plain, soft, and tangible structures. The important font was Arial. Finally, many participants chose boldface text and plain text.

Regarding the readability factor, for the insurance group, readability was a big design problem for the test websites. During the test process, many participants complained that there was too much text with bad readability on the insurance websites. Five insurance websites had design problems in terms of their readability. The general problem was the font sizes. If too much text was included on one page, the participants disliked reading them online. In addition, some interfaces were too crowded for users, for example, the Sta Travel website, which also influenced readability. Finally, many participants complained about Zurich's unclear images. For this factor, there was no especially good website for the insurance group. If we go back to the results of the questionnaires, the Churchill website had the best performance in terms of quality of content from low to high. On this site, participants gave less compliments during the test process. To compare the design of

the welcome page and the content page, the Churchill website supplied better readability for users except some texts were too small and unclear in content. Regarding the readability factor, the choices in fonts and texts were based on the results of EPs testing for the Churchill website. The important font was Arial. The important texts were boldface text and plain text. The font size was from twelve to twenty as in the Mango website.

For the navigation factor, the best performance was the Churchill website with the highest mean value of 4.1 and quite a low standard deviation of 0.738. The Churchill website had several advantages in terms of navigation design. This website was constructed using the traditional top menu. It is very clear to distinguish the difference between internal links, external links, content texts, and title texts. Using different size of fonts and types of texts can help users to become familiar with its navigation in a short period of time. From the results of the participants' opinions, the Churchill website had the same results in terms of navigation. The designers had set the top menu, which was classified into seven main parts on the Churchill website. By using different font sizes and colours to distinguish these links, this design could help users to understand clearly and quickly about the web structure. In addition, the site map was also designed to provide a great amount of information that could easily help users when surfing. Navigation with regard to website design contains two characteristics. One is for the target audience. The other is for general users. Although insurance websites belong to a special market for consumers, the five test websites' navigations were designed for general users. Considering this point, web classifications should be designed to supply more accessibility for users.

From the results of the questionnaires, for question three-loading time (dissatisfied to satisfied), the order of performance from high to low was Churchill, Bupa, Zurich, Ing, and Sta Travel. The best performance regarding loading time for the insurance group was the Churchill website with the highest mean value of 4.6 and a low standard deviation of 0.516. Bupa and Zurich had the same mean value regarding loading time but Bupa's standard deviation was lower than that of Zurich. The worst website was Sta Travel, with a mean value of 3.6 and a standard deviation of 1.174. Comparing this factor with the results of participants' opinions, the results of the questionnaires were very different from the results of the participants' protocol data. The results of the questionnaires were more useful than the results of the participants' stated opinions because the questionnaire covers all components. The participants did not express any opinions at all about loading time but this section

was completed by every participant in the questionnaire. On the average, the loading speed is one or two seconds for the Churchill website.

Among the insurance group, the five test websites had no special animation design. The best website in terms of animation was the Churchill website, with the highest mean value of 3.6 and the lowest standard deviation of 0.966. The worst website was Ing, with the worst mean value of 2.9 and a standard deviation of 1.101. Regarding the animation factor, the results of the questionnaires were the same as the results for the participants' protocol data. Comparing the results of EPs testing, Ing had the strongest performance in terms of design style. This point was emphasized above. During the test process, many participants complained about the Ing animation, the orange jumping ball. This animation was strongly shown on the boards. This evidence can explain why the best design style for the insurance group caused participants' negative emotions. This evidence can also be seen in the results for colour performance. No online videos or special animations were included in these five test websites. The only one special animation design was that the designers had provided a worldwide travel flash for the Sta Travel website. Moreover, a jumping orange ball was designed for the Ing website. Zurich, Churchill, and Bupa had no animation design though they designed their interfaces in flash. In the test process, many participants felt bored when surfing these test websites. Their opinions showed their desire to see some animation design in these websites. Many of the participants felt interested about the nodding dog which is shown on the Churchill website and hoped to seeing this logo animated.

Regarding the links factor, the best performance regarding links was the Churchill website with the highest mean value of 4.2 and the lower standard deviation of 0.789. From the results of participants' opinions, the order for the links was not easily identified. The order could only be obtained from the results of questionnaires. As stated previously, the Churchill site clearly distinguished the differences between the internal links, external links, content texts, and title texts. Users became familiar with its navigation in a short period of time. To reduce the time of learning or to become familiar with new navigation, the links should be made more efficient. The link texts, title texts, and content texts should be designed well for users in order to supply better accessibility for scanning.

There was no sound function for the insurance group. The order of design factors for an insurance website design reference model was taken from the statistics of participants' protocol opinions. The performance of the test websites for each design

factor was taken from the results of the questionnaires. With regard to users' impressions on colour and interface, the results of the emotional probes testing supplied the detailed information. The insurance website design reference model and guidelines are shown below in figure 6.10 and table 6.11. It should be realized that the order of importance in the design reference model was used to determine the order of factors in the design guidelines.

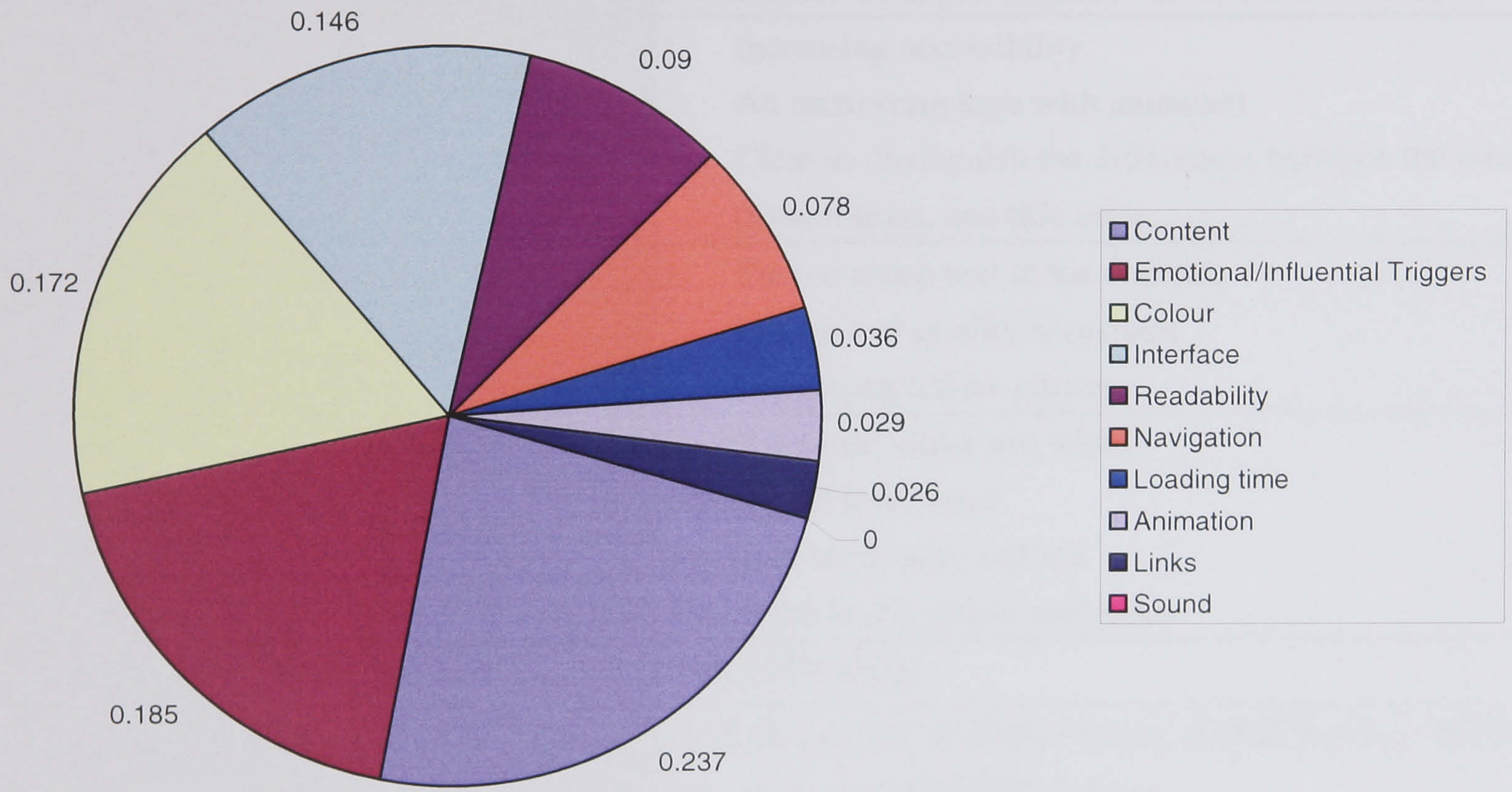


Figure 6.10 the insurance website design reference model

Table 6.11 the guidelines of the insurance website design reference model

The Guidelines of the Insurance Website Design Reference Model		
Factors	Design Points	Guidelines
Content	Web structure	Home, car, travel, pet, breakdown, van, and motorcycle
Emotion	Positive emotion	1. Increasing accessibility 2. An interesting logo with animated 3. Clear to distinguish the differences between the internal links, external links, content texts, and title texts
	Negative emotion	1. Put too much text in the contents 2. Design low quality animation 3. Use strong colour schemes
Colour	User's impression	The first level: violet and white The second level: blue The third level: gray and red The fourth level: yellow and green
	Background digital colour codes	#FFFFFF (white)
	Text colour codes	#663399 (violet), #4598E0 (blue), #0080C0 (blue), #666666 (dark gray), #333333 (hue gray), and #FFFFFF (white)
	High light colour code	#D82832 (red) and #FF6600 (orange)
Interface	Lines	Horizontal line
	Shapes	Square
	Texture	Plain, soft, and tangible structures

Readability	Others	A interesting logo with animation
	Fonts	Arial
	Texts	Boldface text and plain text
	Font sizes	12 to 20
Navigation	Top menu	
Loading time	1 to 2 seconds	
Animation	Add some interesting animation in web contents	
Links	Clear classifications to distinguish differences between internal links, external links, content texts, and title texts	
Sound	None	

6.4 The website impression test system

The website impression test system aimed mainly to improve the disadvantages of the test website in order to get better results for the website impression test and to supply a useful tool for designers to predict users' emotions in the design process. After conducting the test process and the analysis of test results, the test website was improved in three parts in order to supply a better detecting tool for researchers or designers to predict users' emotional responses in website design. The improvements were based on the previous discussions and research findings. The reference models of the website impression test system were evaluated using a test website. The discussions will show separately in the improvements in part one the Think-Aloud usability testing, part two the emotional probes testing, and part three the questionnaires.

6.4.1 The improvements in the Think-Aloud usability testing

When conducting the second pilot test (S.P.T.), the participants sometimes felt puzzled and had no idea about how to present their thoughts in the test process. This situation appeared in a pilot test for the website impression test. Before doing the real test, this situation should be improved in order to carry out the subsequent tests in a flow. After changing to this negotiated method, through using some negotiated questions, the participants can produce more opinions and make more observations during the test process. In addition, this improved method also helped the participants to reduce their anxiety arising from being unfamiliar with the test methods in the test process.

After conducting the second pilot test (S.P.T.), the typical Think-Aloud usability testing method was changed into a negotiated method to carry out these tests. In the test process of the second pilot test (S.P.T.), this section was conducted by the typical method. Through observing several test processes and comparing the participants' opinions, this method was improved to add some simple questions to stimulate the participants to search for more questions and improve their confidence about doing the test. Some of the participants sometimes felt puzzled about using terminology or the navigation of the test websites. Through conducting this improved method, the test can be carried out in a flow.

In general, this improved method still follows the basic rules of the Think-Aloud usability testing. These negotiated questions cannot concern about main questions in

order to avoid appearing errors in the test results. This point is very important for researchers to undertake the test process. In the test process, some participants had questions about the difference between navigation and links. Regarding this point, their difference can be explained before conducting the formal tests. The statistics about participants' positive and negative opinions are very helpful to decide the orders of website design factors. The results also can help researchers or designers to understand the basic performance of design factors in the positive area and the negative area.

6.4.2 The improvements in Emotional Probes testing (EPs testing)

The emotional probes testing aims to discuss design style and to compare the visual influences in design factors. Through to compare the results for two test groups, the influence of animation plays a very important role in the web impressions. On the one hand, in the fashion group, the best design style showed participants' positive impressions. On the other hand, in the insurance group, the strongest design style showed participants' negative impressions. At the initial research stage, the choice in fashion websites and insurance websites, the previous one was decided in higher mean values and the second choice was decided in lower standard deviations. The performances in terms of animation and colour use created the stronger influences for participants' drawings. The EPs testing results can be explained and compared from the results of participants' opinions and the results of the questionnaires. This point is very different from the traditional graphic design field. That means to investigate the influences of design factors in the website design field for the emotional probes testing is necessary. In this part, the previous classification for the questionnaire part was colours, lines, shapes, texture, fonts, and texts. The animation and sound choices will be set in the questionnaire. In addition, to add the sizes of texts for the questionnaire will help researchers to judge more details for readability in order to improve the disadvantage in the performance of readability. Regarding the two test groups, the fashion websites and the insurance websites did not had better performances in terms of readability than other design factors. But readability had the higher order in design factors; it is necessary to set in the questionnaire in order to get more details from the test results. The sizes of text will be set form twelve to twenty as shown below in table 6.12. The scale of text sizes base mainly on the best website performance in terms of readability.

Table 6.12 the questionnaire of the emotional probes testing

Design Components										
Sorts	Sort Numbers and Meanings									
Colours	C1: Black	C2: White	C3: Gray	C4: Blue	C5: Violet	C6: Yellow	C7: Red	C8: Orange	C9: Green	C10: Brown
Lines	L1: Horizontal line	L2: Vertical line	L3: Diagonal line	L4: Angular line	L5: Jagged line	L6: Thinning and thickening line	L7: Curved line	L8: Undulating line	L9: Random line	L10: Grid line
Shapes	S1: Triangle			S2: Square		S3: Circle			S4: Trapezoid	
Texture	T1: Plain Structures		T2: Rough structures		T3: Soft structures	T4: Hard structures		T5: Tangible structures	T6: Intangible structures	
Fonts	F1: Arial		F2: Times		F3: Courier New	F4: Georgia		F5: Verdana	F6: Geneva	F7: Others
Texts	TE1: *Italicized text*		TE2: **Boldface text**		TE3: Underlined text	TE4: Coloured text		TE 5: CAPITAL LETTERS	TE 6: Plain text	
The sizes of texts	ST1: 12 A	ST2: 13 A	ST3: 14 A	ST4: 15 A	ST5: 16 A	ST6: 17 A		ST7: 18 A	ST8: 19 A	ST9: 20 A
Animation	A1: Very exciting		A2: Exciting		A3: Average		A4: Unexciting		A5: Very unexciting	
Sound	SO1: Very good		SO2: Good		SO3: Average		SO4: Bad		SO5: Very bad	

In this part, the improvements can supply more details about the influences of animation, sound, and readability. This way can help designers to judge website performances to involve more design factors. Regarding participants' impressions for design style belong to negative or positive performances, the results can be compared to the results of participants' protocol data and the results of the questionnaires. After conducting the website impression test (W.I.T.), some visual performances in texts and fonts, many participants were not familiar in these design factors. In this part, the visual performances will be designed into the same type in order to help participants' choices. During the test process, some visual performances were not easy to draw on the boards. This real situation also point out the importance of the short supplemental questionnaire in the emotional probes testing.

6.4.3 The improvements in questionnaires

In the results of participants' protocol data, the codes were classified into eleven groups, which are navigation, loading time, links, interface, sound, animation, emotion, colour, readability, content, and personal comment. In the questionnaires, the original of the questionnaire consisted of quality of content from unexciting to exciting, quality of content from low to high, loading time from unsatisfied to satisfied, navigation from difficult to easy, links from inefficient to efficient, animation from unattractive to attractive, consistency from dissimilar to similar, use of colour from bad to good, use of layout from bad to good, and information presentation from clear to confused.

Table 6.13 the questionnaire for detecting participants' emotions

Factors	Adjective Nouns
Navigation	Difficult-Easy
Loading time	Unsatisfied-Satisfied
Links	Inefficient-Efficient
Interface	Difficult-Easy
Sound	Bad-Good
Animation	Unattractive-Attractive
Emotion	Negative-Positive
Colour	Bad-Good
Readability	Unclear-Clear
Content	Bad-Good

Protocol codes were decided after conducting the website impression test (W.I.T.).

These codes were used to compare the participants' opinions in the test process. Regarding to compare two sorts of data in a easy way, the classification of the questionnaire will change into navigation from difficult to easy, loading time from unsatisfied to satisfied, links from inefficient to efficient, interface from difficult to easy, sound from bad to good, animation from unattractive to attractive, emotion from negative to positive, colour from bad to good, readability from unclear to clear, and content from bad to good. The improved questionnaire is shown above in table 6.13.

Regarding the results of the participants' protocol data, the importance of emotion appeared in the fashion group and the insurance group. Emotion had the third performance in the fashion group and the second performance in the insurance group. To add this factor into the questionnaire is necessary for this test system. This improvement can also help to compare the results of participants' opinions and the results of the emotional probes testing. Regarding use of layout, this factor will change to interface. In addition, consistency and information presentation will contain in the content factor on the site.

6.5 Summary

The orders of design factors were decided after conducting the analysis of the website impression test (W.I.T.). The order of website performance for individual design factors and the details of the design factors will be based on the results of the questionnaires and the results of the emotional probes testing. After conducting the website impression test (W.I.T.), the importance of animation was appealed in the results of the emotional probes testing. In the fashion group, the best design style was the Diesel website. In addition, in the insurance group, the Ing website had the strong performance in terms of design style. This test result showed that dynamic website design may be another foci for website design and animation and colour play vital roles in the website design field. The questionnaires supplied another viewpoint to measure participants' opinions. In the analysis of the test results, this method helped researchers to improve the disadvantage of Think-Aloud usability testing. Some errors may appear in the results of Think-Aloud usability testing. As mentioned it previously, qualitative research sometimes needs to get some quantitative data in order to support the research result.

After conducting the discussion in proposed detecting methods, the improvements of the website impression test (W.I.T.) can supply more clear classification in the emotional probes testing and the questionnaires. The research outcomes contain the

fashion website design reference model, the insurance website design reference model, and the website impression test system. After conducting the website impression test (W.I.T.), many valuable experiences were obtained in order to supply further in this research field.

Chapter 7 Validation of the Research Outcomes

7.1 Introduction

This chapter consists of the validation of the prototype website and the fashion website design reference model.

The test methods and data analysis use the process methods and the evaluation methods from the website impression test (W.I.T.). The process methods are Think-Aloud usability testing, Emotional Probes testing, and questionnaires. The evaluation methods are a coding system and statistics. The results of the improved website impression test (I.W.I.T.) were compared with the results of the website impression test (W.I.T.) in order to identify the validation of the research outcomes. In addition, the improvements to the fashion test website from the participants' opinions will be discussed in this chapter.

7.2 Construction of the prototype website and the fashion website design reference model

A fashion test website was constructed using the fashion website design reference model and improved after conducting the improved website impression test (I.W.I.T.). The fashion test website consists of the welcome page, the menu page, the shopping online page, the view the collection page with five product pages, the stores page, the careers page, the about the brand page, the video show page which involved three content pages, the FAQ page, the download page, and the new season collection page.

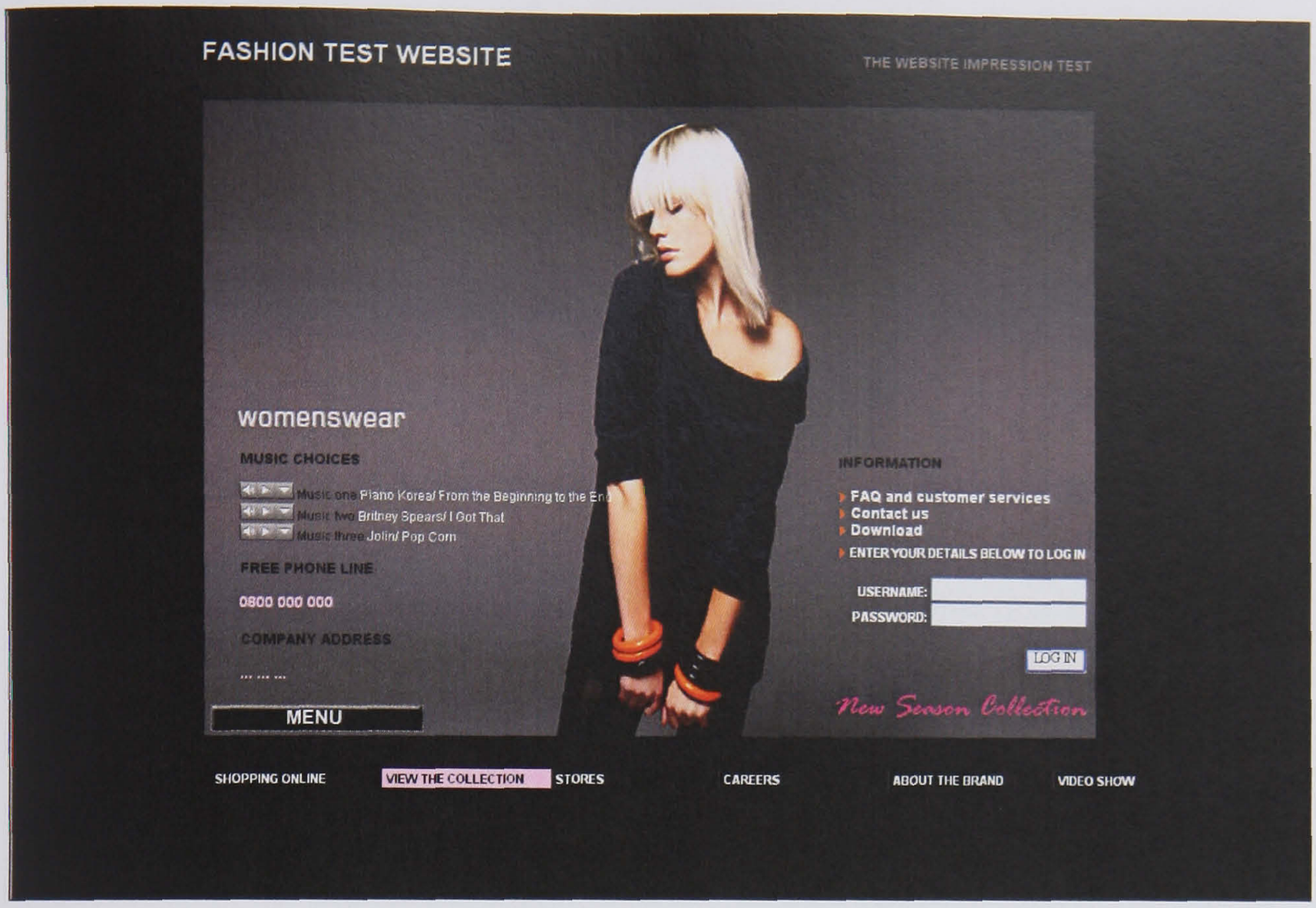
Using the fashion website design reference model, the website content consists of shopping online, view the collection, stores, careers, about brand, and videos of the designers' concepts and fashion vs. style pages. The fonts were Arial plus a hand writing font used on the menu page. The main texts were coloured and upper case. The font sizes were set from point 12 to 20 from title to content texts and were decided upon by importance. The navigation was a drop-down menu placed in the centre of the screen. Right side navigation, with a list of images, was used for the product pages. The zoom function with high quality images was used in the view the collection page.

The background digital colour codes were #000000 (black) and #FFFFFF (white). The text colour codes were #666666 (dark gray), #999999 (pale gray), and #FFFFFF

(white). The highlighted colour codes were #FF00FF (pale pink) and #FF99CC (dark pink). The above colour codes make up the main colour scheme for the fashion test website.

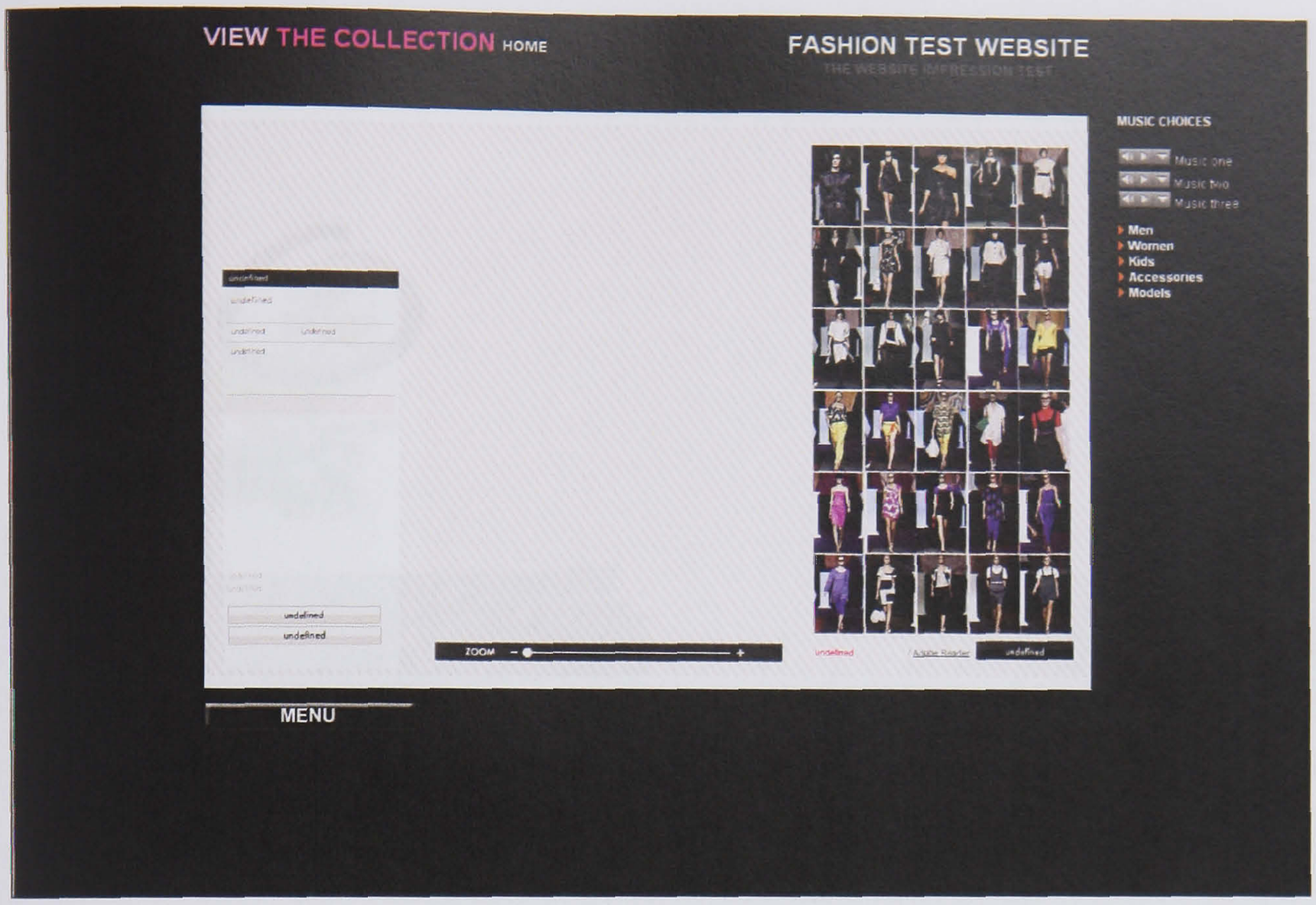
Within the interface, the main line was the horizontal line. The main shape was square. The main texture was plain, hard, and tangible structures. The loading time for each page was limited to one to two seconds. The old movie effect within Flash was used in the new season collection page, the design of which was based on the results of the participants' opinions for the website impression test (W.I.T.). After conducting the improved test, some of the design problems concerned with the navigation, links, colour, and content images were improved. The sound function was set to a music choice of users. The images of the fashion test website are shown below in figure 7.1. In addition, the page titles are shown below.

The welcome page



The menu page

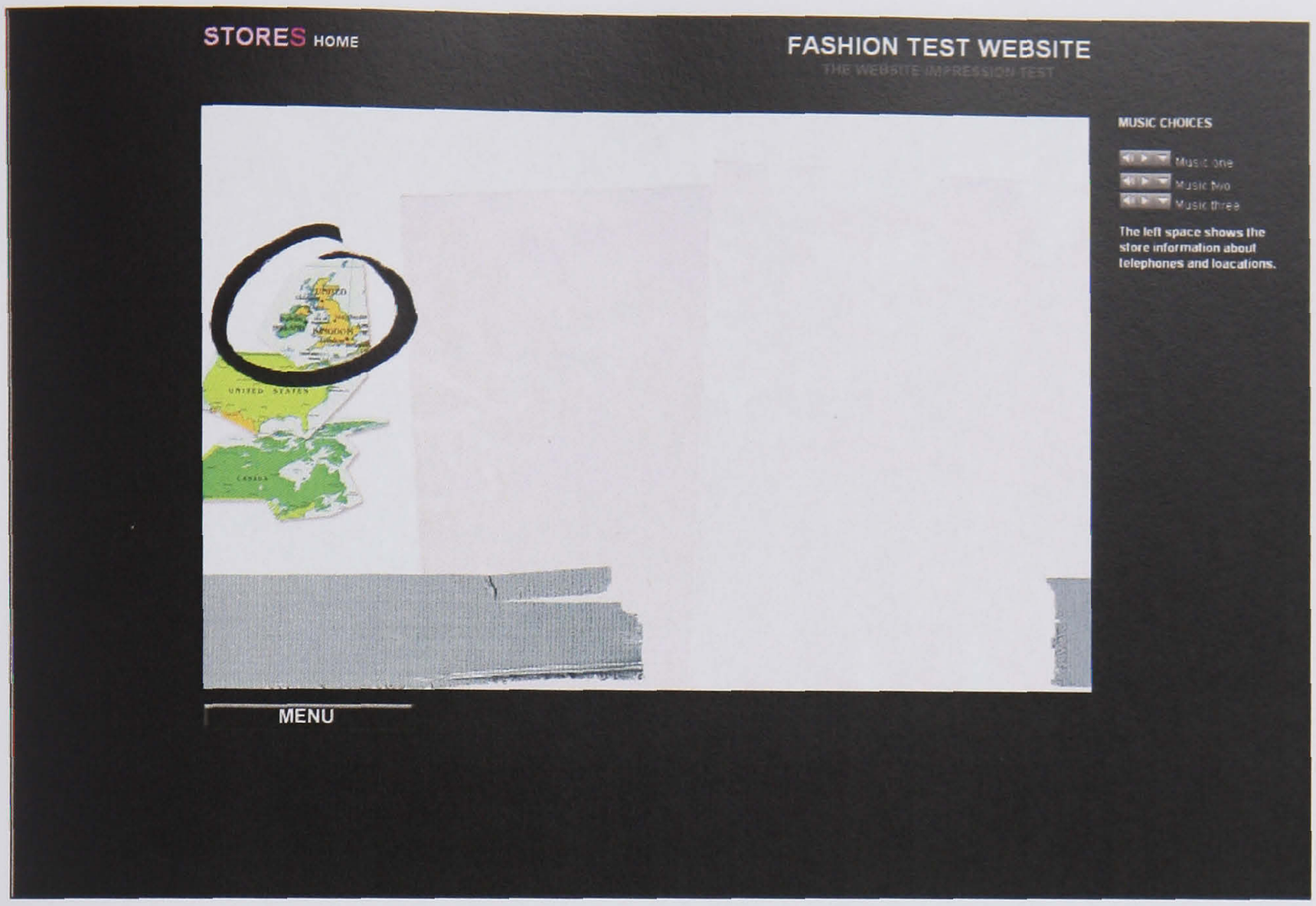
The shopping online page



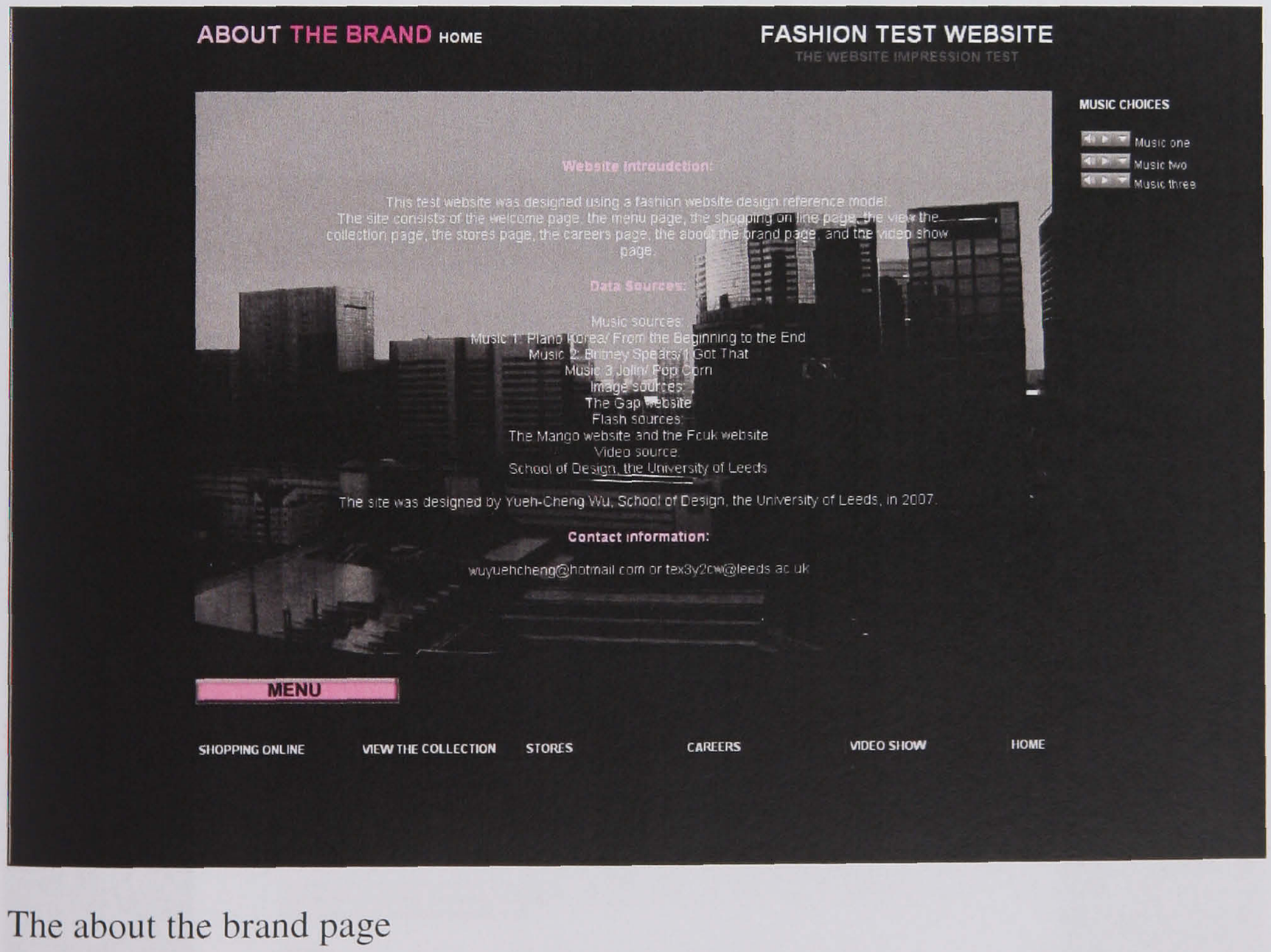
The view the collection page

The view the collection page consists of view the collection, men, women, kids, accessories, and models.

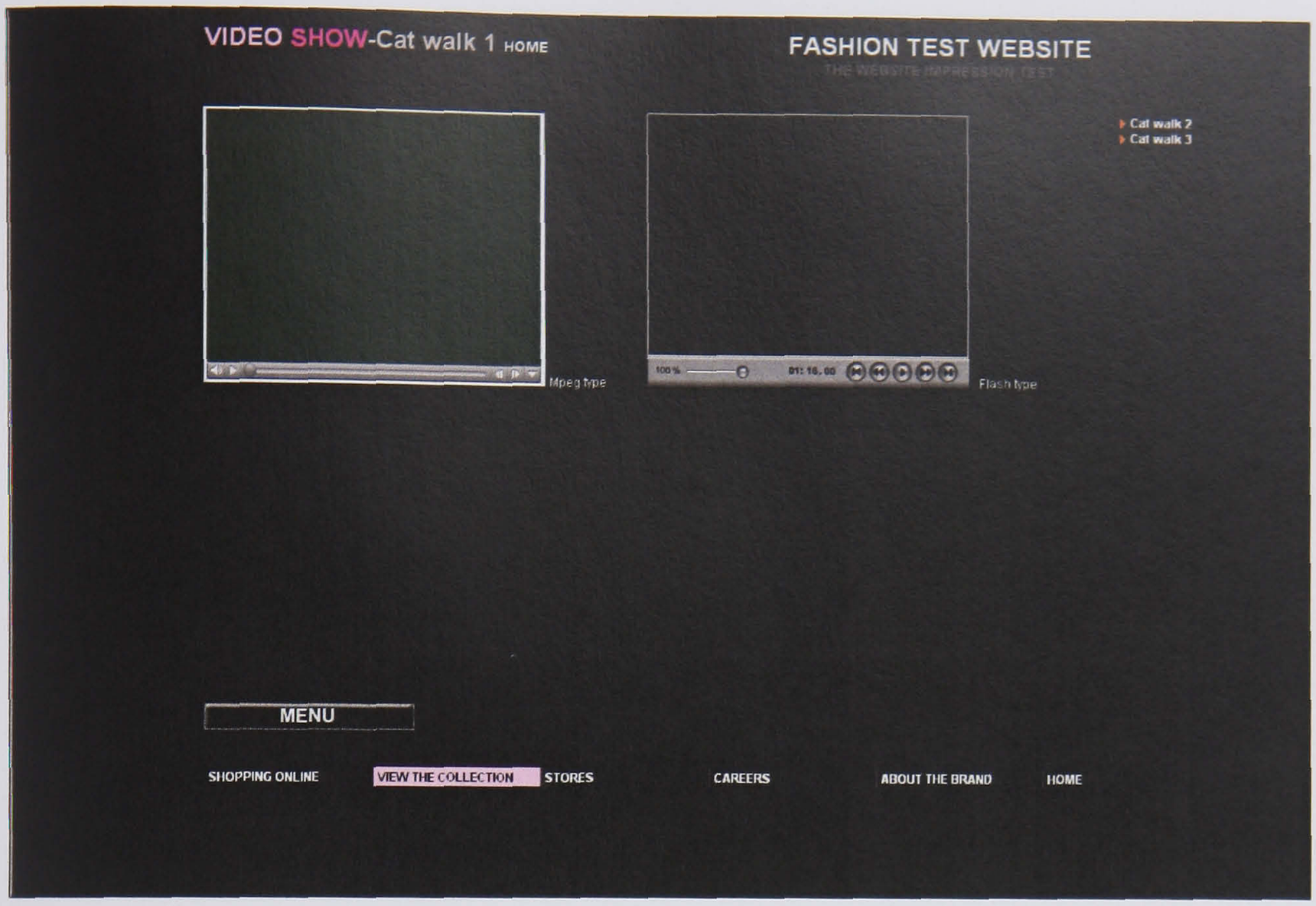
The product page



The stores page

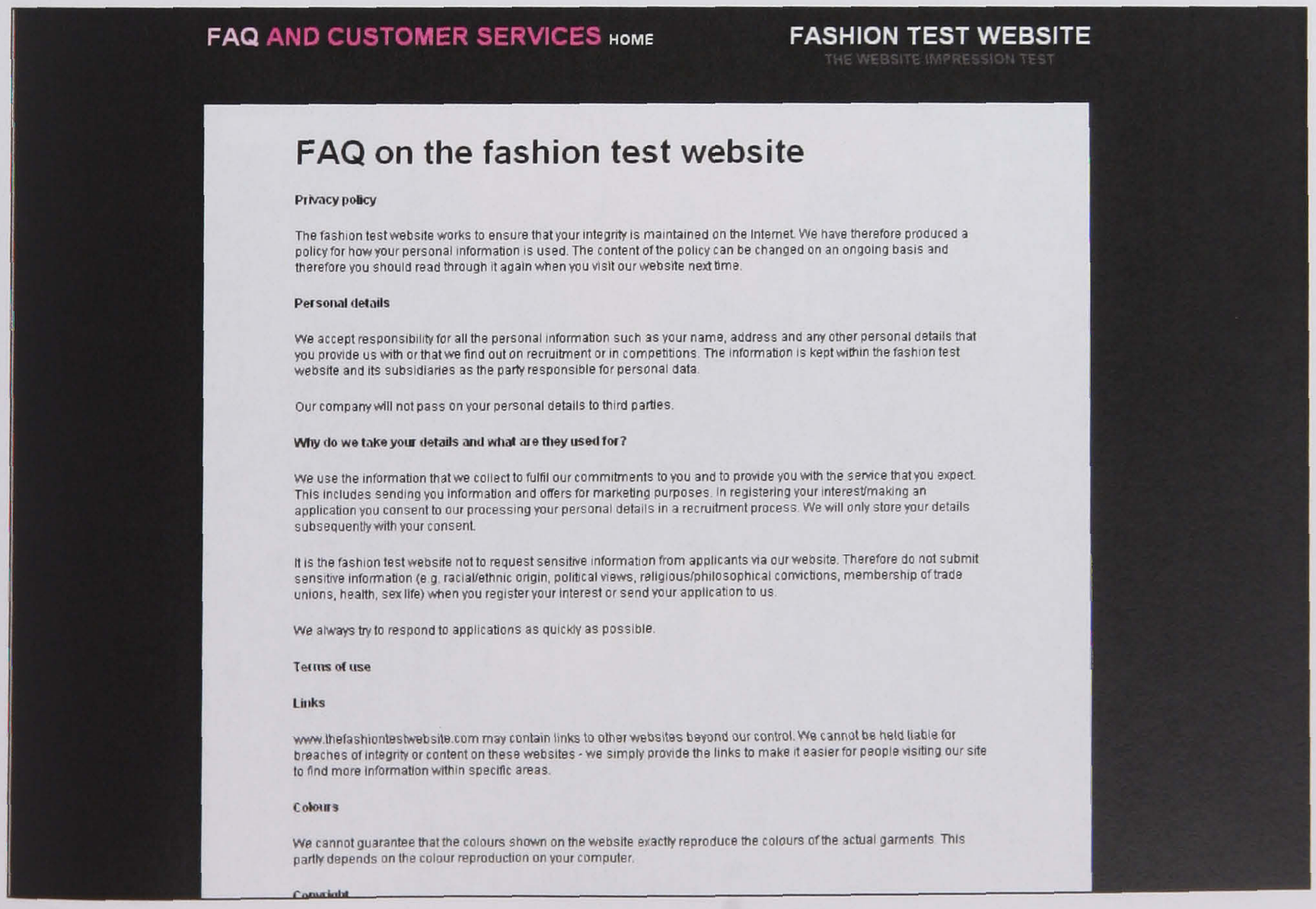


The about the brand page

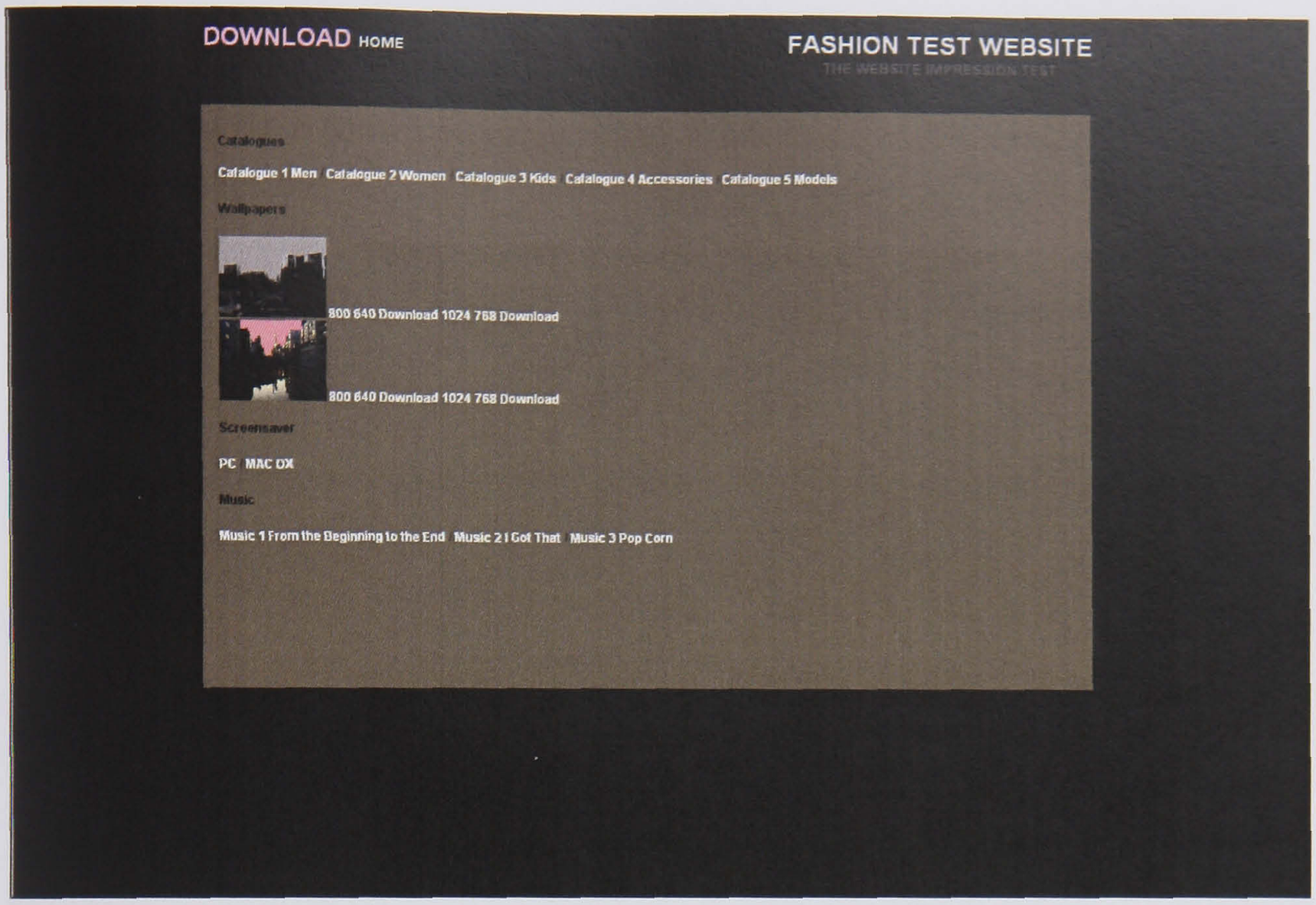


The video show page

The video show page consists of cat walk 1, cat walk 2, and cat walk 3.

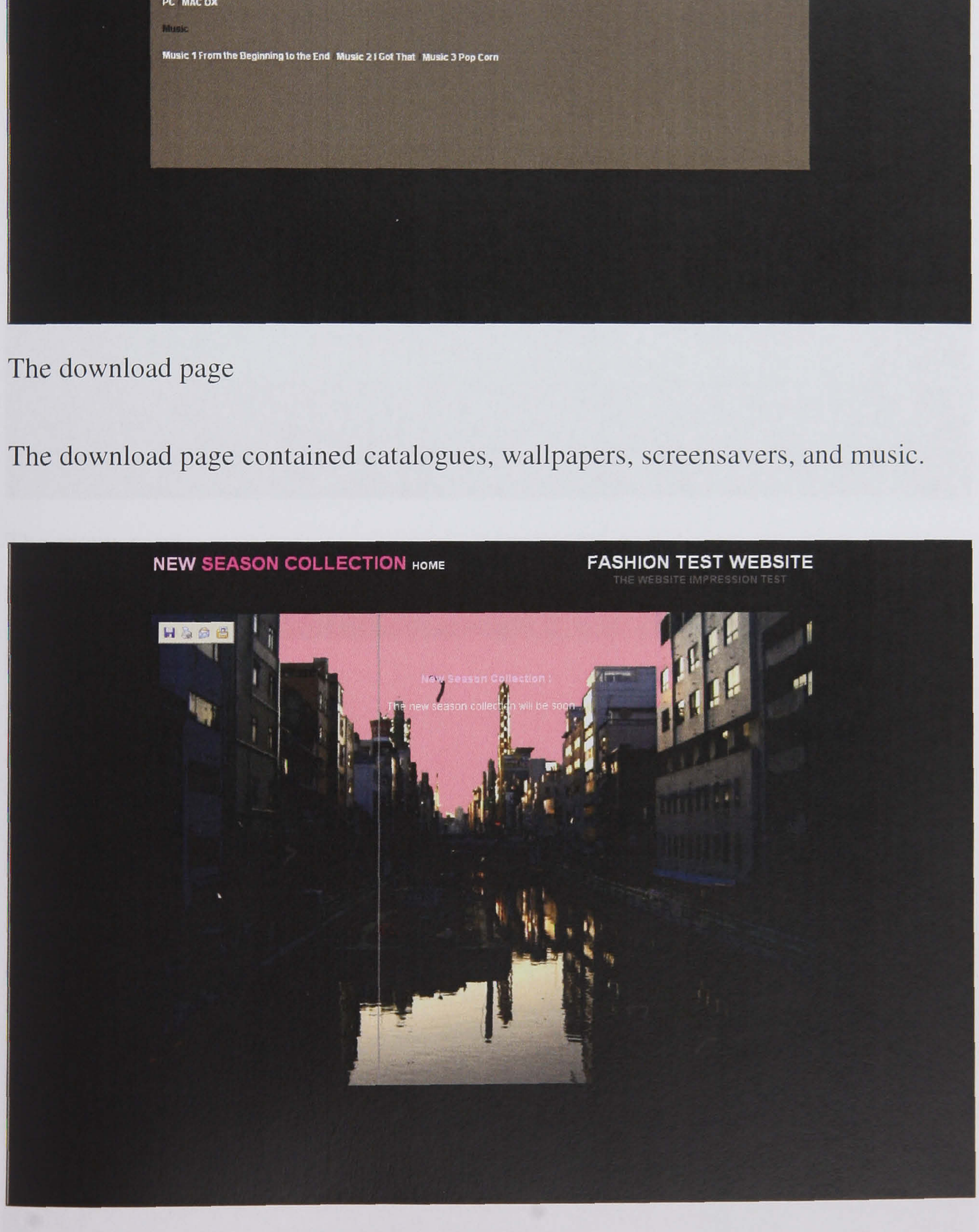


The FAQ (frequently asked question) page



The download page

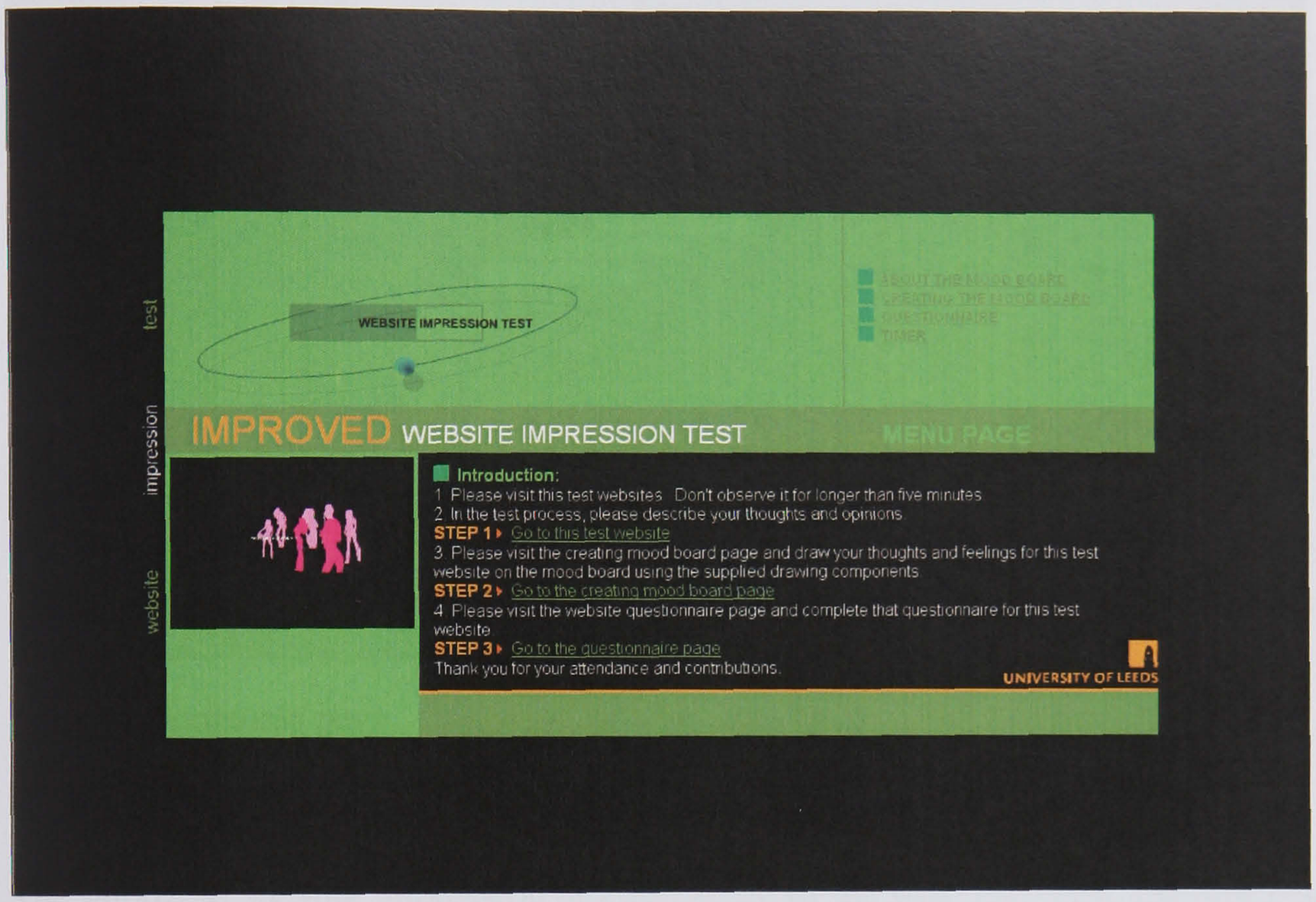
The download page contained catalogues, wallpapers, screensavers, and music.



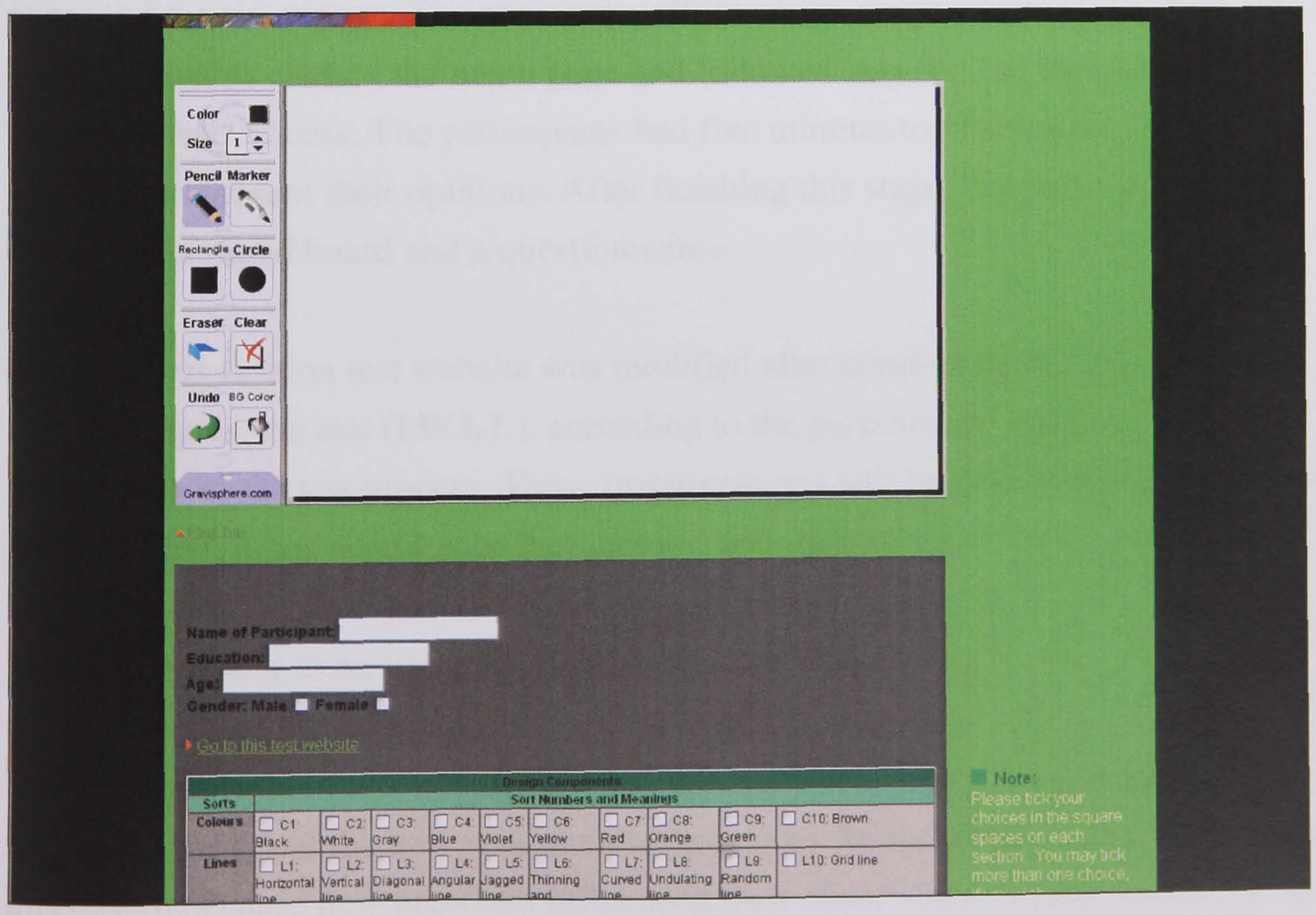
The new season collection page

Figure 7.1 the fashion test website

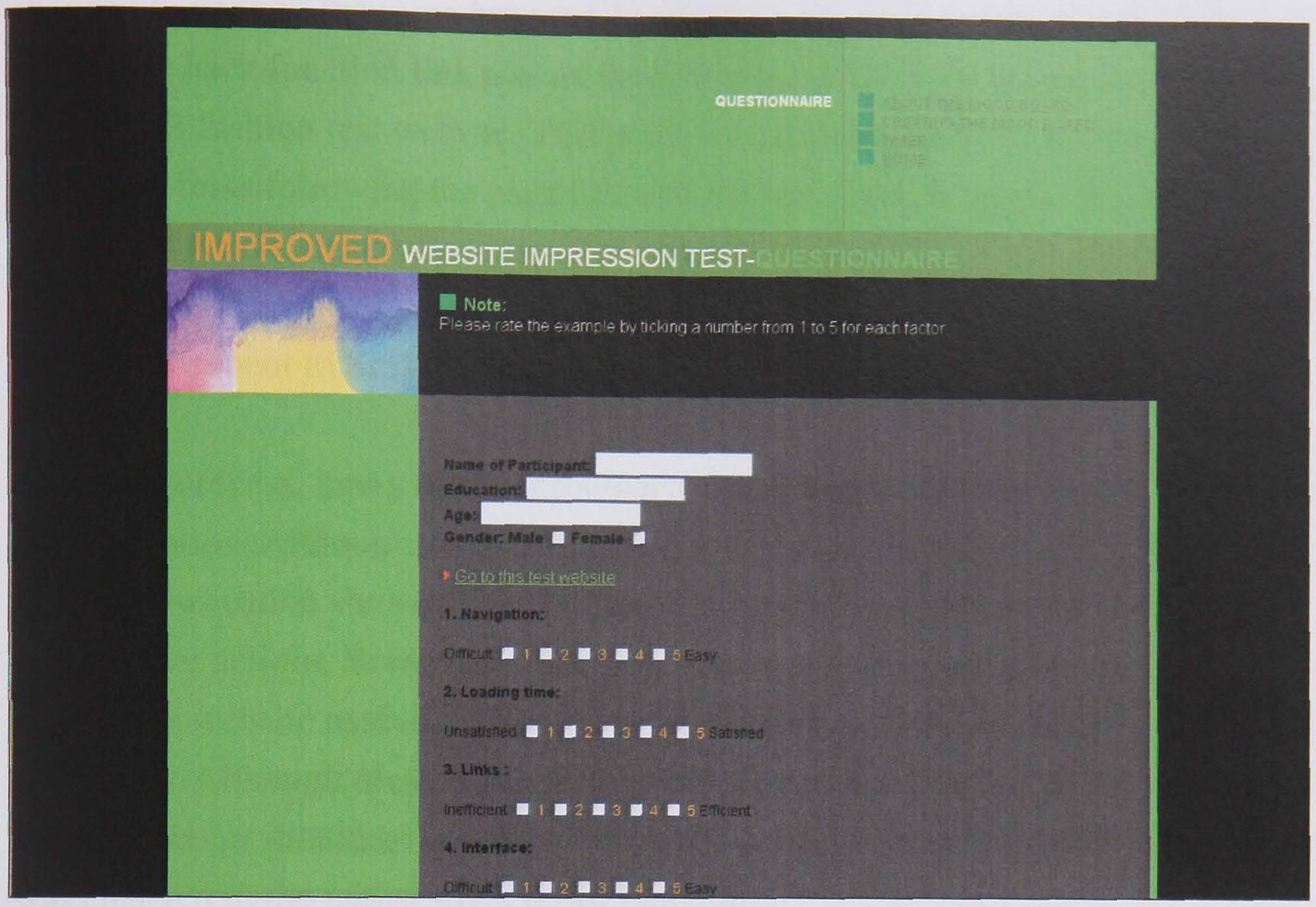
The improved website test site consists of six pages. The part pages of the improved website test site are shown below in figure 7.2. The page titles are shown below.



The menu page



The EPs testing page



The questionnaires page

Figure 7.2 the improved website impression test site

The improved website impression test site involved the welcome page, the menu page, the about the mood board page, the creating the mood board page, the questionnaire page, and the timer page. The choice was discussed in chapter six-research outcomes. The participants clicked the menu page and followed steps one to three to complete the whole test process. The participants had five minutes to observe the fashion test website and present their opinions. After finishing this stage, the participants completed a mood board and a questionnaire.

The previous fashion test website was modified after conducting the improved website impression test (I.W.I.T.), according to the participants' opinions and the observation of the test process. These improvements will be discussed below in terms of navigation, links, sound, interface, colour, and readability.

The improvement to navigation:

The previous fashion test website opened new browsers for the FAQ page, the download page, and the new season collection page. Some of the participants disliked this design because new browsers influenced their observation during the test process. Regarding the participants' opinions and users' behaviour, all of the pages were

changed to open in the same browser. In addition, the participants also thought that setting the back function link text on the title page or the logo is convenient for surfing this fashion test website. This point was also improved to set the back function in the text links following the page title and the logo back function. The main navigation was designed as a drop-down menu.

The improvement to links:

In the test process, many of the participants clicked the menu in order to observe the site navigation. Although no participants discussed this point during the test process, the test observation showed that this function needed to be improved in order to reduce error actions. Sometimes, the error action will give users' negative emotions and reduce website usability. This function was designed with a mouse-over function previously. Although none of the participants mentioned this during the test process, this user action should be considered in order to obtain better usability. This function was changed to the mouse click down function.

The improvement to sound:

During the test process, one participant felt great dislike for the performance of the sound. The main problem resulted from the sound contents. This design problem can be improved using users' choices of sound. The previous design in terms of sound was to set music choices for the users. Considering this point, the sound function could be combined with the music database type in order to supply more music choices for the users. In addition, some clicking sound can be added to the navigation icons in order to create a real feeling of control over these icons for users. This function was added to the internal links of the product page.

The improvement to interface:

During the test process, one participant felt that the video show page contained too many colour blocks on the screen. Especially regarding the gray block, his opinion was that this page was not finished. In addition, he felt the way video clips were arranged affected visibility. This design problem was improved by removing the colour blocks and rearranging the layout of the video frames.

The improvement to colour:

Changing the previous colour scheme and adding gray to balance different design styles in this fashion test website resulted from one female participant's mood board and participants' opinions. Because the fashion test website was constructed using design factors from different websites, these different design styles influenced the whole website impression for users. The participants felt that they could easily observe the different websites during the test process. The main problem resulted from the colour performance of the images and the animation. One participant clearly described the four different design styles from the fashion test websites on the board. Although this test website was designed using the same colour scheme, this influence still appeared in the test process. The improvement was to add gray and change some images in order to balance these different design style influences from images and animations.

From the design perspectives, to use the same colour scheme should produce a similar colour feeling of the web page for users. The results of the website impression test (W.I.T.) and the improved website impression test (I.W.I.T.) showed that animation colour and image colour play an important role in users' colour feelings. This influence plays a key role in website colour choices. The participants showed an influence on their boards and in their opinions. This result pointed out the need to use different viewpoints to consider colour schemes in the website design process. It might be better to consider the colour choice for website design from the traditional graphic design field and the influence of animation. Both of them are important in building a good colour scheme in the design process.

The improvement to readability:

In the previous test website, the image choice for the menu page influences readability. Two participants felt that the text part cannot be seen clearly. This point about the arrangement between texts and images is important in the design process. After changing these images and rearranging the text position, this design problem has been improved. If using text to present the above images, readability should be considered well in the design process.

7.3 The validation of the prototype website and the fashion website design reference model

The validation of the prototype website was supported in the three results of the improved website impression test (I.W.I.T.), which was conducted from 20th-23rd

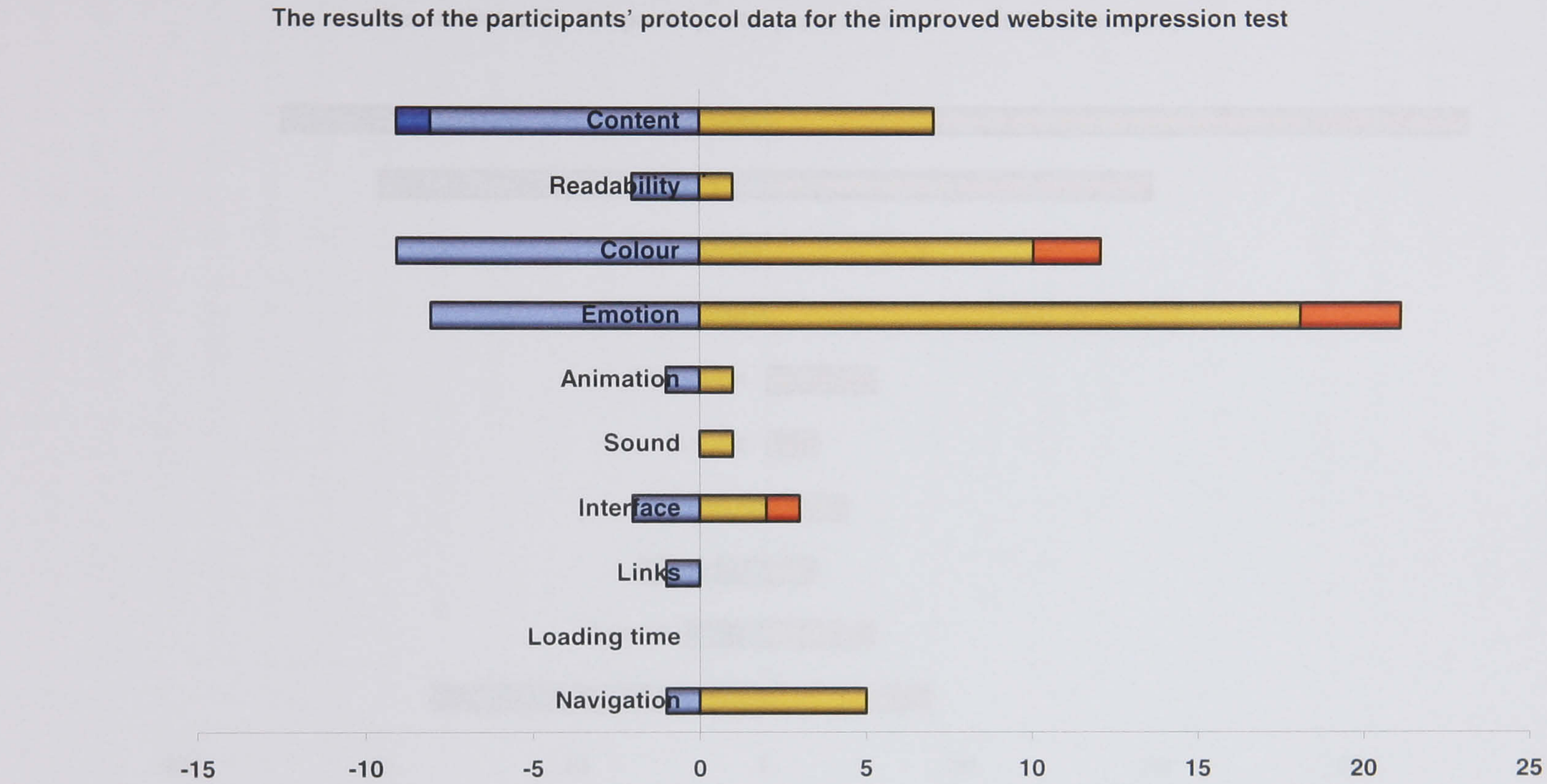
March 2007. Six participants attended this improved test; five females and one male. The average test time is fifteen minutes. The average age is twenty-eight years old. The participants' educational backgrounds are five PhD students and one MA. In addition, all of the participants have good web experience. The test methods and data analysis followed the proposed process and evaluation methods from the website impression test (W.I.T.). The test results will be compared with the results of the W.I.T in order to identify the validation of the research outcomes. Think-Aloud usability testing, Emotional Probes testing, and questionnaires were used to predict the users' emotional responses about this fashion test website. The evaluation methods were a coding system and statistics.

The results of the participants' protocol data for the fashion test website:

Table 7.3 shows the results of the participants' opinions for the improved website impression test (I.W.I.T.). In addition, figure 7.4 shows a chart showing the results of the participants' protocol data for the improved website impression test (I.W.I.T.). Moreover, figure 7.5 shows the fashion group statistics for protocol data for the website impression test (W.I.T.).

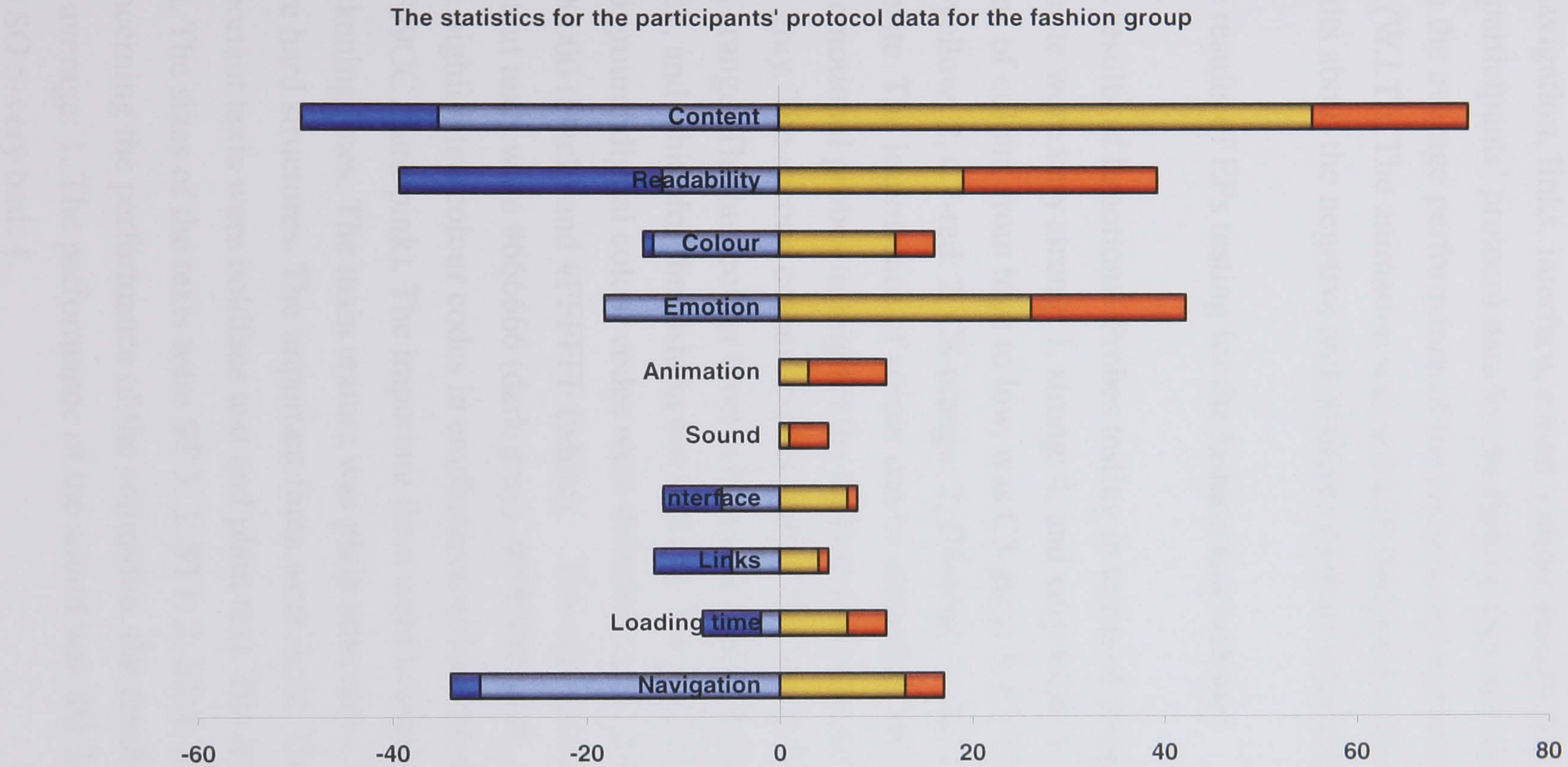
Table 7.3 the results of the participants' protocol data for the improved website impression test

Factors	Codes							
Navigation	**A**xx	0	**A**x	5	**A**y	1	**A**yy	0
Loading time	**B**xx	0	**B**x	0	**B**y	0	**B**yy	0
Links	**C**xx	0	**C**x	0	**C**y	1	**C**yy	0
Interface	**D**xx	1	**D**x	2	**D**y	2	**D**yy	0
Sound	**E**xx	0	**E**x	1	**E**y	0	**E**yy	0
Animation	**F**xx	0	**F**x	1	**F**y	1	**F**yy	0
Emotion	**G**xx	3	**G**x	18	**G**y	8	**G**yy	0
Colour	**H**xx	2	**H**x	10	**H**y	9	**H**yy	0
Readability	**I**xx	0	**I**x	1	**I**y	2	**I**yy	0
Content	**J**xx	0	**J**x	7	**J**y	8	**J**yy	1
Personal comment	**K**	4						



	Navigation	Loading time	Links	Interface	Sound	Animation	Emotion	Colour	Readability	Content
Very negative	0	0	0	0	0	0	0	0	0	-1
Negative	-1	0	-1	-2	0	-1	-8	-9	-2	-8
Very positive	0	0	0	1	0	0	3	2	0	0
Positive	5	0	0	2	1	1	18	10	1	7

Figure 7.4 the results of the participants' protocol data for the improved website impression test



	Navigation	Loading time	Links	Interface	Sound	Animation	Emotion	Colour	Readability	Content
Very negative	-3	-6	-8	-6	0	0	0	-1	-27	-14
Negative	-31	-2	-5	-6	0	0	-18	-13	-12	-35
Very positive	4	4	1	1	4	8	16	4	20	16
Positive	13	7	4	7	1	3	26	12	19	55

Figure 7.5 the fashion group statistics for the protocol data

Comparing figure 7.4 and figure 7.5, the results of the participants' opinions about the improved website impression test (I.W.I.T.) elicited fewer negative emotional responses than the results of the participants' opinions about the website impression test (W.I.T.). In the performance of emotion for the improved website impression test (I.W.I.T.), this factor contained twenty-one positive emotions and eight negative ones. In navigation, links, interface, sound, colour, readability, and content, the results of the participants' protocol data for the fashion test website showed better performances than the average performance of the fashion test websites for the website impression test (W.I.T.). The animation was not well designed in this fashion test website. The results about the negative and positive opinions were identical.

The results of EPs testing for the fashion test website:

The results of Emotional Probes testing in terms of design style for the fashion test webiste were very strong: 1, strong: 4, and very weak 1. The order of performance in terms of colour, from high to low, was C3-gray: 5, C1-black: 4, C2-white: 3, C6-yellow: 2, C7-red: 2, C8-orange: 2, C4-blue: 1, and C5-violet: 1 on the Mango website. The importance of colour can be classified into four levels from the results of the emotional probes testing for the fashion test website. The first colour level is black and gray. The second colour level is white. The third colour level is yellow, red, green, and orange. The last colour level is blue and violet. The main colours used were gray, black, and white for the fashion test website. On the fashion test website, the background digital colour codes were #666666 (dark gray), #999999 (pale gray), #000000 (black) and #FFFFFF (white). The text colour codes from the titles to the content texts were #666666 (dark gray), #999999 (pale gray), and #FFFFFF (white). The highlighted colour codes in emphasized colour were #FF00FF (pale pink) and #FF99CC (dark pink). The important lines were horizontal, and thinning and thickening lines. The main texture was plain structures. The less important structures were hard structures. The important fonts were Arial, Times, and others. The important texts were boldface text and plain text. The less important text was coloured text. The sizes of the texts were ST 3: 3, ST1: 2, ST 2: 2, ST 6: 2, and ST 9: 2. Concerning the performance of the animation, the results were A2-exciting: 5 and A3-average: 1. The performance of the sound was SO 2-good: 4, SO 3-average: 1, and SO 5-very bad: 1.

One participant drew four small different images on the board during the test process. This result shows that, to balance different design styles in one site, it is very important to create the whole impression for users. According to her opinions, she

thought that the about the brand page had a different design style from the other pages. This point was very important in pointing out the disadvantages in terms of the design style of the fashion test website.

The performance of design style for the fashion test website is very strong: 1, strong: 4, and very weak: 1. The results of the Emotional Probes testing for the improved website impression test (I.W.I.T.) are shown below in table 7.6.

Table 7.6 the results of Emotional Probes testing for the improved website impression test

The Results of Emotional Probes Testing for the Improved Website Impression Test													
Colours		**Lines**		**Shapes**		**Texture**		**Fonts**		**Texts**		**The sizes of texts**	
SN	**N**	**SN**	**N**	**SN**	**N**	**SN**	**N**	**SN**	**N**	**SN**	**N**	**SN**	**N**
C1	4	L1	3	S1	0	T1	4	F1	3	TE1	0	ST 1: 12	2
C2	3	L2	2	S2	5	T2	1	F2	4	TE2	4	ST 2: 13	2
C3	5	L3	0	S3	3	T3	1	F3	0	TE3	1	ST 3: 14	3
C4	1	L4	1	S4	0	T4	2	F4	0	TE4	2	ST 4: 15	0
C5	1	L5	0			T5	1	F5	0	TE5	0	ST 5: 16	0
C6	2	L6	1			T6	1	F6	0	TE6	4	ST 6: 17	2
C7	2	L7	3					F7	2			ST 7: 18	0
C8	2	L8	1									ST 8: 18	0
C9	0	L9	0									ST 9: 20	2
C10	0	L10	1										

Animation		**Sound**		**Design Style**	
SN	**N**	**SN**	**N**	**DS**	**N**
A1	0	SO1	0	VERY STRONG	1
A2	5	SO2	4	STRONG	4
A3	3	SO3	1	FAIRLY STRONG	0
A4	0	SO4	0	AVERAGE	0
A5	0	SO5	1	FAIRLY WEAK	0
				WEAK	0

				VERY WEAK	]									
				NONE	()									

Colours: C1: Black, C2: White, C3: Gray, C4: Blue, C5: Violet, C6: Yellow, C7: Red, C8: Orange, C9: Green, C10: Brown

Lines: L1: Horizontal line, L2: Vertical line, L3: Diagonal line, L4: Angular line, L5: Jagged line, L6: Thinning and thickening line, L7: Curved line, L8: Undulating line, L9: Random line, L10: Grid line

Shapes: S1: Triangle, S2: Square, S3: Circle, S4: Trapezoid

Textures: T1: Plain structures, T2: Rough structures, T3: Soft structures, T4: Hard structures, T5: Tangible structures, T6: Intangible structures

Fonts: F1: Arial, F2: Times, F3: Courier New, F4: Georgia, F5: Verdana, F6: Geneva, F7: Others

Texts: TE1: Italicized text, TE2: Boldface text, TE3: Underlined text, TE4: Coloured text, TE5: Capital letters, TE6: Plain text

The sizes of texts: ST1: 12, ST2: 13, ST3: 14, ST4: 15, ST5: 16, ST6: 17, ST7: 18, ST8: 19, ST9: 20

Animation: A1: Very exciting, A2: Exciting, A3: Average, A4: Unexciting, A5: Very unexciting

Sound: SO1: Very good, SO2: Good, SO3: Average, SO4: Bad, SO5: Very bad

The results from the questionnaires for the fashion test website:

The fashion test website had a higher performance in terms of content and loading time. Regarding the content, this website had a 4.5 mean value with a 0.837 lower standard deviation. The loading time performance was a 4.5 mean value with a 0.548 lower standard deviation. This result showed that the participants had strong agreement about the performances of loading time and content. Regarding readability, the fashion test website had a mean value of 4 with a 1.265 standard deviation. This result was better than that for the five fashion test websites for the website impression test. Some design problems about readability resulted from the lack of contrast between the images and texts. These problems had been improved after changing some web images. Navigation, links, interface, animation, and colour had similar results in this test. Sound had a 3.167 mean value with a 1.169 higher mean value. According to the participants' opinions, the problem was the sound choices. Regarding emotion, this factor had a 3.833 higher mean value with a 0.753 lower standard deviation. This result showed that the participants felt satisfied with the fashion test website in terms of the performance of emotion. This point is very important for the final research outcome. The results of the questionnaires are shown below in table 7.7 and figure 7.8.

Table 7.7 the results of the mean values and standard deviations for the improved website impression test

		Fashion Test Website	
Factors	**Adjectival nouns**	**MV**	**SD**
Navigation	**Difficult Easy**	3.5	0.837
Loading Time	**Unsatisfied Satisfied**	4.5	0.548
Links	**Inefficient Efficient**	3.5	1.049
Interface	**Difficult Easy**	3.667	0.816
Sound	**Bad Good**	3.167	1.169
Animation	**Unattractive Attractive**	3.667	1.033
Emotion	**Negative Positive**	3.833	0.753
Colour	**Bad Good**	3.667	0.516
Readability	**Unclear Clear**	4	1.265
Content	**Bad Good**	4.5	0.837

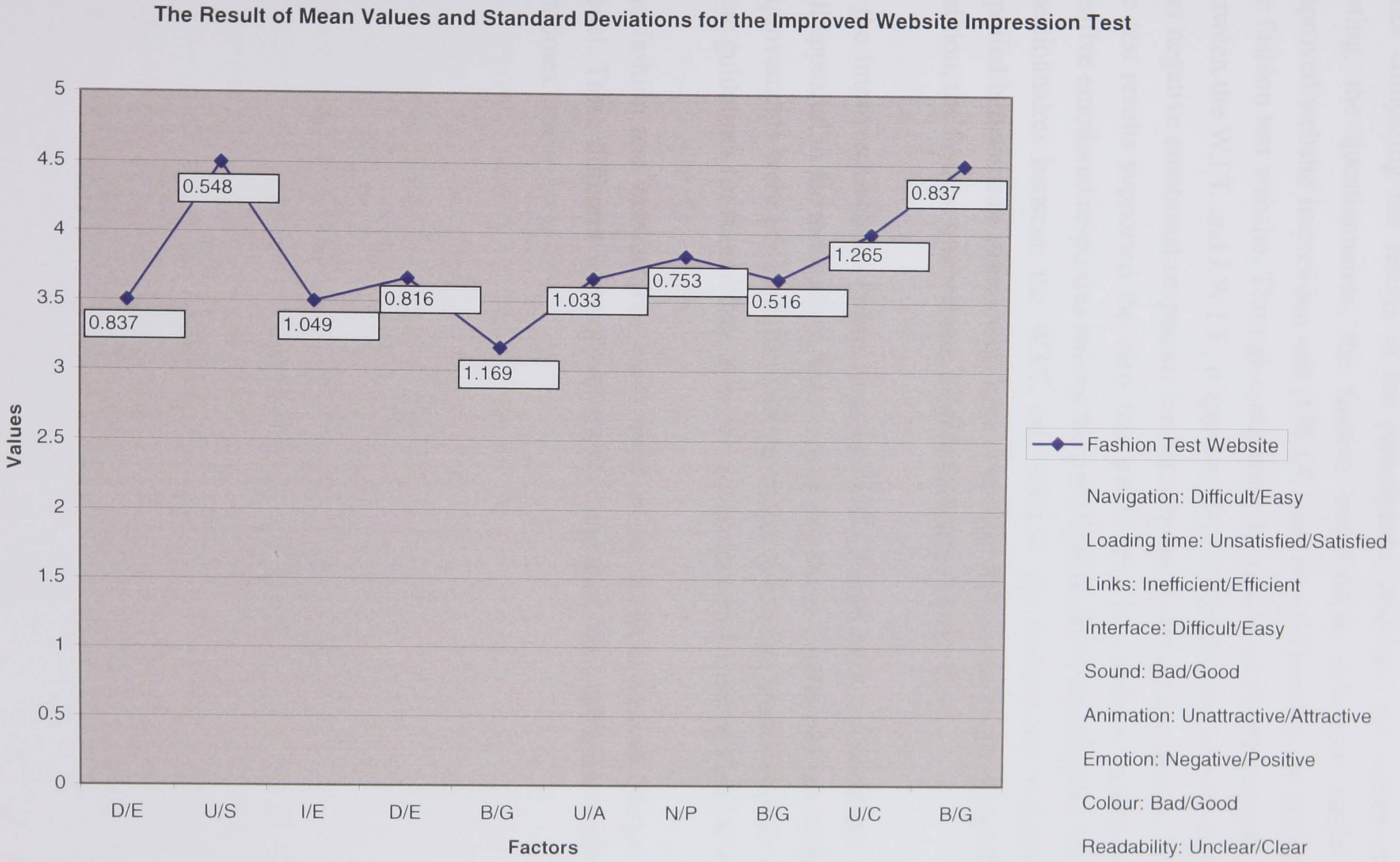


Figure 7.8 the results of the mean values and standard deviations for the improved website impression test

7.4 Summary

After comparing the results of the participants' opinions, the results of the EPs testing, the questionnaires, the fashion test website reference model and the improved website impression test (I.W.I.T.) can be validated by the performance of the fashion test website. Through comparing the results of the participants' opinions between the W.I.T. and I.W.I.T., it appears that the fashion test website had supplied less negative emotional responses for participants in ten design factors. In addition, the test results supported the view that the fashion test website should create very positive emotional responses among the participants. By comparing the results of the questionnaires between the W.I.T. and I.W.I.T., the fashion test website had also supplied better mean values with lower standard deviations in ten design factors. In addition, the fashion test website supplied a better design style.

In the improved website impression test (I.W.I.T.) process, a few design problems still appeared in the navigation, links, sound, interface, colour, and readability. These improvements were added to the fashion design reference model in order to supply more guidelines for researchers and web designers about creating fashion websites.

The fashion test website was built based on the fashion website design reference model. Three different sorts of test results supported the validation of the research outcomes.

Chapter 8 Conclusions and Recommendations

This chapter provides a reflective critique of the research project undertaken and summarizes the research findings discussed in the earlier chapters. Future research and recommendations are made to extend the research project through further studies and identify opportunities for further affective research.

8.1 The reflective evaluation of the research process

After conducting the literature review, the initial pilot test (I.P.T.), the second pilot test (S.P.T.), the website impression test (W.I.T.), and the improved website impression test (I.W.I.T.), this affective study became a loop to identify the role of emotional design in website design. The research outcomes are a fashion website design reference model, an insurance website design reference model, and an improved website impression test system. This fashion website design reference model was identified by conducting the improved website impression test (I.W.I.T.) on a fashion test website. In this learning process, the research involved a transfer site, an initial pilot test site, a website impression test site, an improved website impression test site, and a fashion test site (see the research DVD-Rom attached to the back cover of this thesis).

Nielsen (2000b) introduced usability testing that used four to five people. Over eighty percent of design problems can be solved through user testing. Other design problems could result from users' emotions or website content. This assumption was proved basically through conducting this affective study.

The aim of the initial pilot test (I.P.T.) was to explore a range of website types and the perceptions of web users in order to decide on the sort of websites which would be relevant to this study and the next possible research process for the effective study of affective website design. This test process also supplied some useful experience for the further affective study. The analysis strategy used Statistics-Mean Values and Standard Deviations. Fifty-three participants attended the initial pilot test (I.P.T.). Forty sets of data were used to analyze this pilot test. The results of the initial pilot test (I.P.T.) showed that fashion and insurance websites were the best choice for the next research stage. An open-ended question was designed in the initial pilot test (I.P.T.). Few participants supplied comments about this question. This result demonstrated the importance of the close-ended questionnaire for the website impression test (W.I.T.) to measure the importance of each design factor. In

addition, this test process supplied some experience of controlling the test time and improving the test methods for the website impression test (W.I.T.).

A test website was constructed for the website impression test (W.I.T.), the main purpose of which was to create a website design reference model in order to produce a website that could meet the requirements of the research results and for future use for website designers. The second pilot test (S.P.T.) was conducted in order to observe and improve the test process of the website impression test (W.I.T.). Two participants attended the second pilot test (S.P.T.). One female participant assessed the fashion group, and a male participant joined the insurance group. Reducing the number of test websites from ten to five for each group after conducting the second pilot test (S.P.T.) was intended to reduce the test time from two hours to one. Some visual and interface problems were also improved after conducting the second pilot test (S.P.T.). Because the test time was overly long, the participants easily lost concentration, and their errors would cause the research to lose its value. The test plan for the website impression test (W.I.T.) and the second pilot test (S.P.T.) of the website impression test (W.I.T.) supplied more understanding before conducting the formal test. Through undertaking the three phases of the methodology in the fieldwork, many valuable experiences were obtained.

Two main concepts were used to construct the website impression test site. The first consideration was to supply better test processes for the participants. After conducting the second pilot test (S.P.T.), visual presentations of the test website, the structure of the test website, and some web functions were changed in order to achieve this aim.

Twenty participants attended the website impression test (W.I.T.), which consisted of three different methods of detecting the participants' emotions: Think-Aloud usability testing, Emotional Probes testing (EPs testing), and questionnaires. The evaluations also consisted of two sets of values: a coding system and statistics-MV & SD (Mean Values and Standard Deviations). Through using the three phases of methodology, user's insightful emotions were identified.

The phases of the methodology:

Phase 1:

Determination of Think-Aloud test method, designing questionnaires, and Emotional Probes testing: identify websites and carry out the website impression

test (W.I.T.)

Phase 2:

Data Analysis: carry out the website impression test (W.I.T.), data analyses of the results of participants' protocol data, Emotional Probes testing, and the results of the questionnaires

Phase 3:

Making of the website design reference model from the data analysis: create and carry out the verification and validation of research outcomes

During the test process, the limitation of Think-Aloud usability testing depended on the user's skill and experience. The Think-Aloud method guidelines were altered after conducting the second pilot test (S.P.T.). The main objective of Think-Aloud usability testing is to identify the role of emotional design and its influence in affective website design research. The results of the EPs testing supplied more details about design style and the participants' impressions of the visual design factors. By producing a mood board at the test website, the participants can create their impressions about the test websites on the board. By conducting this part, each basic visual factor and its influences can be discussed and compared with the design styles. Some of the participants sometimes felt puzzled about using the terminology or navigation of the test websites. The results of the questionnaires demonstrated the performances of the test websites. Through collecting the participants' opinions from the test process of the website impression test (W.I.T.), both positive and negative emotions can be found in the test. The evidence is revealed in the participants' opinions and data analyses. The data from the emotional probes and usability questionnaire can be compared with the participants' opinions in order to analyze the importance of these basic design elements and their influences on website design.

The results of the participants' protocol data and the results of questionnaires showed that emotion played an important role in the website outcomes. In addition, the results of the EPs testing indicated that animation has a strong influence on the users' impressions. This influence was also related to the users' impressions about the performance of colour and the users' preferences. The performance of the animation also featured widely on the participants' created mood boards. In the fashion group, the participants showed strongly positive emotions about the animation performance on the boards. Conversely, in the insurance group, the participants showed negative emotions about the performance of animation on the boards. This result also reveals the importance of animation in website design in terms of the users' impressions, which was very different from that of the graphic

design. In the two groups, a similar situation occurred regarding the performance of colour.

Using questionnaires compensated for the disadvantages of Think-Aloud usability testing. In this section, the participants needed to answer all of the questions which might be ignored during the Think-Aloud usability testing. In addition, questionnaires can improve the unnatural characteristics of using Think-Aloud usability testing for participants. Think-Aloud usability testing can supply more research findings and offer better design factor choices in this test but the questionnaires can supply a better-analyzed strategy for the test results. Both of them are necessary for the improved website impression test (I.W.I.T.). For improvements to the test methods, see Chapter 6 Research Outcomes-the Website Design Reference Model and the Website Impression Test System.

The aim of the improved website impression test (I.W.I.T.) was to identify the fashion design reference model and the confirmation of the website impression test system. After conducting the improved website impression test (I.W.I.T.), the test results showed that the research outcomes are valid. Six participants attended the improved website impression test (I.W.I.T.). During the test process, several new findings from participants' opinions can be added into the guidelines for the fashion website design reference model. These findings are discussed in section 7.2.

8.2 The results of the research outcome

This affective study provides a new method for detecting user's emotional responses. In addition, this research provides an approach to enhance website usability testing and understand user's positive emotions. Final research outcome can provide web designers an efficient method to evaluate web outcomes.

'Wow' is an interesting word for users. This word in website design might be used to describe very different feelings of the users. This feeling may involve the users' surprise and interests. This word is used in the tagline for Microsoft's Vista at the time of writing. 'Cool' is a word that is often used by people in their communication with others. During the test process, the participants often used this word when they found something interesting. In addition, many people often use this word in their daily life.

Emotional design in terms of website design and the impact of emotional design can

be discussed in terms of web usability and web contents. Regarding web usability, it may be relevant to navigation, loading time, links, interface, sound, animation, colour, readability, design style, and data updating. Web content may involve design style. In these two fields, the importance of the users' emotions should be considered carefully in the design process. Its importance is decided by the importance of the design factors and web content. Through conducting the website impression test (W.I.T.) and the improved website impression test (I.W.I.T.), the order of design factors for the fashion and insurance groups also showed their individual importance in emotional design. The order of the design factors for the fashion group was decided after analyzing the website impression test (W.I.T.). For the fashion group, the order of the factors from the results of the participants' protocol data, from high to low, was content, readability, emotion, navigation, colour, interface, loading time, links, animation, and sound, but this was because only two sites used animation and sound. The order of design factors for the insurance group was decided after analyzing the website impression test (W.I.T.). For the insurance group, the order of the factors from the results of the participants' protocol data, from high to low, was content, emotion, colour, interface, readability, navigation, loading time, animation, links, and sound, but none of the test websites used special animation design and sound. Data updating was not measured in the test process.

The evaluation method for emotional design in website design has been discussed and supported in this affective study. To use the research results to enhance the quality of website design was identified on the fashion test website and the test analysis of the improved website impression test (I.W.I.T.). The methods were improved several times after conducting the initial pilot test (I.P.T.), the second pilot test (S.P.T.), and the website impression test (W.I.T.), as discussed in chapters 3, 4, 5, 6, and 7. Triangulation is a good method for comparing different results. Through using this method, the design factors can be compared for different methods in order to reduce the number of research errors.

In the results of the website impression test (W.I.T.), the Diesel website had the best performance in terms of design style but a poor performance in the results of the participants' protocol data and the results of questionnaires.

> While large clothing retailers like Banana Republic and Gap have standardized and simplified the layout of their stores in an effort to put customers at ease. The Diesel approach is based on the unconventional premise that the best customer is a disoriented one.

> 'We're conscious of the fact that, outwardly, we have an intimidating environment,' said Niall Maher, Diesel's director of retail operations. 'We didn't design our stores to be user-friendly because we want you to interact with our people. You can't understand Diesel without talking to someone.' (Norman, 2004b: 92)

Diesel also extends this businesses strategy to design the Diesel website. Although the Diesel website had the best performance in terms of animation, sound, and design style in the results of the website impression test (W.I.T.), the fact was that many participants thought this website was difficult to use. This fact explains that some website design conventions are still very important in the design process. In addition, UCD and usability still play an important role to build an optimize website.

The improved website impression test (I.W.I.T.) involved Think-Aloud usability testing, EPs testing with an improved supplemental short questionnaire, and questionnaires using an improved questionnaire which can be seen in chapter 7 or the improved website impression test site on the research DVD-Rom.

8.3 Future research and recommendations

The key design point for web designers is to tempt users to stay longer on the website and take more from the website. Website design covers a great number of different research fields. Technological development helps web designers to create more possibilities in website design but also adds more challenges to the design process. In this affective study, the test websites did not contain much animation or sound effects but the results of the EPs testing for the website impression test (W.I.T.) showed some evidence of the influence of animation. Dynamic website development efficiently supplies a brand new research field for designers to create pleasure and fun for web users. In addition, sound may be a new research field to be added to website contents or to supply blind or partially sighted people with a convenient web environment.

> Sound can be playful, informative, fun, and emotionally inspiring. It can delight and inform. But it must be designed as carefully as other aspects of design. Today, little thought is given to this side of design, and so the result is that the sounds of everyday things annoy many while pleasing few (Norman, 2004b: 123).

At present, dynamic websites are difficult, since designers only use traditional design concepts to deal with design problems in the design process. Because of the popularity of online games, the importance of the development of dynamic websites will become greater. The design problem may appear in the past navigation, sound, colour, loading speed, and animation. This field will be a new challenge for website design which also has relevance to emotional design. Different sorts of websites should have different considerations in the design process but some usability considerations and design conventions should be similar. After conducting this affective study, emotion may be necessary to be added into the web usability testing in order to supply better design outcomes for users.

The future challenges for website design may involve two different approaches. The first challenge is to design variable web design elements which will not cause users to experience negative emotions. The second challenge is to develop dynamic websites in order to create fun and pleasure for web users.

> Becoming a good web designer requires a solid understanding of the web environment in order to anticipate and plan for these shifting variables. Eventually, you'll develop a feel for it (Niederst, 2001: 37).

This 'feel' could also be a challenge for web designers. In contemporary times, designers still need to face many unknown challenges to develop their website projects.

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